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178621

(No Model.)

H. MAY.

WATCHMAN'S TIME RECORDER.

No. 472,896. Patented Apr. 12, 1892.

Fig. 1.

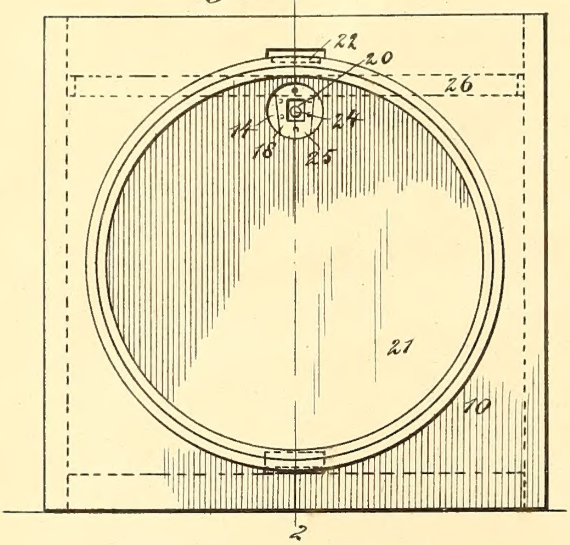


Fig. 2.

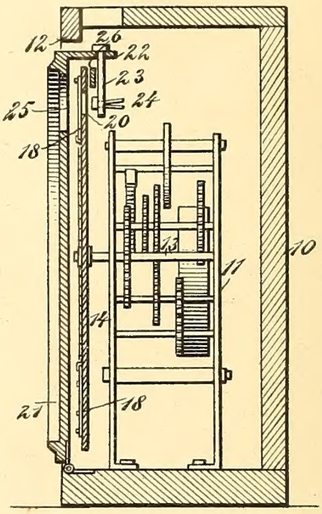


Fig. 3.

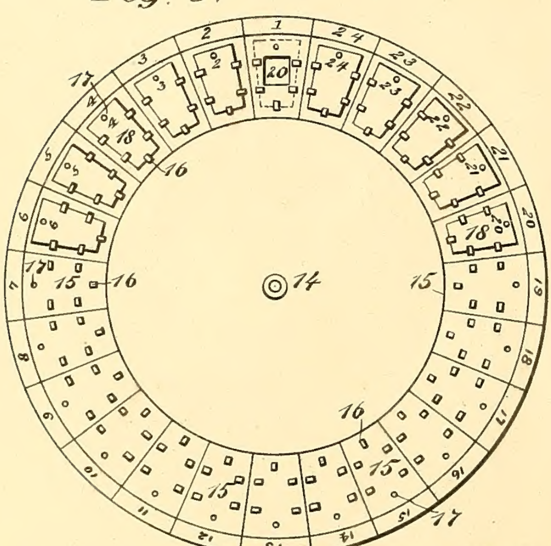


Fig. 4.

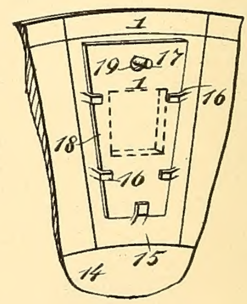
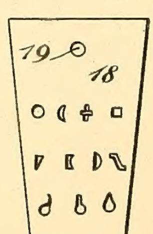


Fig. 5.



WITNESSES:

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C. Sedgwick

INVENTOR:

H. May

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

HENRY MAY, OF SCRANTON, PENNSYLVANIA.

WATCHMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 472,896, dated April 12, 1892.
Application filed June 5, 1891. Serial No. 395,237. (No model.)

To all whom it may concern:

Be it known that I, HENRY MAY, of Scranton, in the county of Lackawanna and State of Pennsylvania, have invented a new and Improved Watchman's Clock and Indicator, of which the following is a full, clear, and exact description.

My invention relates to an improvement in watchmen's clocks and indicators, and has for its object to provide a mechanism through the medium of which it may be determined how long a watchman has remained at a central or main station and the length of time that he has been absent therefrom.

A further object of the invention is to provide a means whereby it may be determined at what stations the watchman has called or reported and the hour at which he returned to the central or main station.

A further object of the invention is to provide the clock with a time-lock of simple, durable, and economic construction, which lock will effectually prevent the recording-dial from being tampered with without the effects being made visible.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation of the device. Fig. 2 is a vertical section taken practically on the line 2 2 of Fig. 1. Fig. 3 is a front elevation of the dial of the clock. Fig. 4 is a perspective view of an enlarged segment of the dial, and Fig. 5 is a front elevation of a ticket punched and adapted to be placed upon the dial of the machine.

Within a casing 10 a clock-movement 11 of any approved construction is located, the said movement being preferably a twenty-four-hour movement. In the front of the casing an opening 12 is made, which opening is preferably circular, and upon the hour post or spindle 13 of the time-movement a dial or disk 14 is securely fastened, the said dial or disk being preferably slightly smaller than the opening 12 in the casing. The dial or disk is divided near its periphery into twenty-four segmental panels 15, which panels, if so desired, may be designated by numbers running from 1 to 24. Each segmental panel 15 is provided with a series of clips or cleats 16 upon its outer face, the said clips or cleats being preferably arranged to correspond to the shape of the panels, as is best illustrated in Fig. 4, the cleats or clips being arranged at the sides and inner ends of the panels, but not at their outer ends, as at this point a pin 17 is secured to each panel.

The clips or cleats are adapted to receive and maintain in position upon the dials tickets 18, and the tickets preferably correspond to the contour of the panels. Each ticket is provided near its outer end with an opening 19 to receive a pin 17, as is likewise best shown in Fig. 4, the pins serving to prevent the tickets from dropping from the dial when their outer ends face downward. The tickets 18 may bear numbers corresponding to the numbers upon the panels adapted to carry them.

One or more of the panels, preferably one, are provided with an opening 20, extending through from face to face of the disk. Ordinarily but a single opening is employed, and it is located in a panel which will be brought uppermost at a predetermined hour in the day.

The opening 12 in the casing is adapted to be covered by a door 21, which door is ordinarily hinged at its lower end to the bottom of the casing, and the upper edge of the door is provided with a horizontal lip 22, extending within the casing, when the door is closed, over the upper edge of the disk or dial 14. The lip 22 has an aperture produced therein adapted to receive a key 23, and the key when in position engages at its head only with the lip. Near the lower end of the key an opening is made, through which a cotter-pin 24 or the equivalent thereof is passed. The position of the head of the cotter-pin is such that when the opening 20 in a panel is brought uppermost or to a central position with respect to the vertical axis of the door or dial the head of the cotter-pin will be visible, and it may be removed, even when the door is

closed, through the medium of an opening 25, made in the upper portion of the door, which opening is preferably circular and of greater diameter than the width of the panel-opening 20.

The key 23 may be dropped into the aperture of the lip through an opening in the top of the casing. The key, however, cannot be disengaged from the lip of the door, owing to the cotter-pin 24, and preferably a bar 26 is extended from side to side of the casing between the dial and the key, as shown in Figs. 1 and 2, which will be in the path of the head of the cotter-pin when the key is raised, and it is impossible for the cotter-pin to be driven from the key when the panel-opening 20 does not register with its head, as the pin will be brought in engagement with the rear face of the disk or dial.

In connection with the apparatus above described hollow punches are employed, one of said punches being adapted to be located at each station to be visited by the watchman. The punch at each station produces an aperture of a different design, and the punches are permanently fixed—that is, they cannot be removed, although they may be readily operated.

In operation if a watchman comes on duty at the twentieth hour, for instance, the ticket marked "20" and carried by the dial-segment so marked will be brought opposite the opening 25 in the door and the ticket may be readily removed by the watchman. Should the watchman remain at the main station another hour, the next ticket presented at the end of the hour is also removed by him, which will indicate to the inspector of the implement that the watchman was on duty at those hours at the main office. When the watchman removes the second ticket, he will, for instance, start out upon his rounds. The ticket last removed he will carry with him and will puncture the ticket with the punches at the various stations at which he may call. Upon the return of the watchman to the main station or office he awaits the presentation of another ticket and removes said ticket, replacing it with the punctured ticket, which will indicate to the inspector that the stations indicated by the punctures upon the ticket have been visited and that the time occupied in making the rounds is the number of hours represented by the number of tickets remaining in the segments of the dial between the punctured ticket and the vacant segment from which the said ticket was removed before being punctured. Thus it will be observed that a perfect tally or check is obtained upon the watchman and that the punches located at the several stations act in the capacity of counter-checks, as the number of particles they contain which have been removed from the punched tickets should correspond to the number of apertures or punctures in the ticket.

As heretofore stated, the lock—that is, the key and cotter-pin—is a time-lock, and the face of the dial cannot be exposed by opening the door until the predetermined hour, at which time the inspector is supposed to be at hand, and when said hour arrives the panel-aperture 20 will register with or be opposite the head of the cotter-pin 24, admitting of the removal of said pin from the key, and consequently the withdrawal of the key from engagement with the door. It will be observed that the device is exceedingly simple, durable, and economic in construction and that the plan of operation is within the scope of understanding of the average man.

If in practice it is found desirable, a number instead of but a single ticket or check may be carried by each panel, thus enabling the clock to indicate the movements of a number of watchmen, and instead of the dial being made to revolve once in twenty-four hours the construction of the clock mechanism may be varied to cause the dial to make one revolution in a greater or in a less number of hours, and I further desire it to be understood that any approved material may be employed in the construction of the dial, the door, and the tickets or checks.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a watchman's clock and indicator, the combination, with a dial and a time mechanism revolving the same, of panels formed upon the dial and representing periods of time, and checks carried by the panels, as and for the purpose specified.

2. In a watchman's clock and indicator, the combination, with a time-movement and a dial having its face divided into panels representing periods of time, of cleats or clamps carried by the panels, and checks removably held by the said cleats or clamps, substantially as shown and described.

3. In a device of the character described, the combination, with a casing having an opening in its front, a time-movement located within the casing, and a dial rotated by the time-movement, having its face divided into panels representing periods of time, a panel being provided with an opening extending through from face to face of the disk or dial, of checks carried by the panels and removable therefrom, a cover provided with an opening through which the checks are visible at intervals, and a time-lock carried by the cover, as and for the purpose specified.

4. In a device of the character described, the combination, with a time-movement, a dial rotated by said movement, having its face divided into panels representing periods of time, and checks removably carried by the panels, of a cover having an opening through which the checks are visible at intervals, and hollow punches adapted to perforate sundry of the checks, as and for the purpose specified.

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5. In a watchman's clock or indicator, a check or ticket carrying dial having its face divided into panels representing intervals of time, as and for the purpose specified.

6. In a watchman's clock and indicator, a ticket or check carrying dial having its face divided into panels representing periods of time, each panel being adapted to carry a check or ticket, and a twenty-four-hour time-movement rotating the dial, as and for the purpose specified.

HENRY MAY.

Witnesses:
D. J. JENKINS,
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178621

(No Model.)

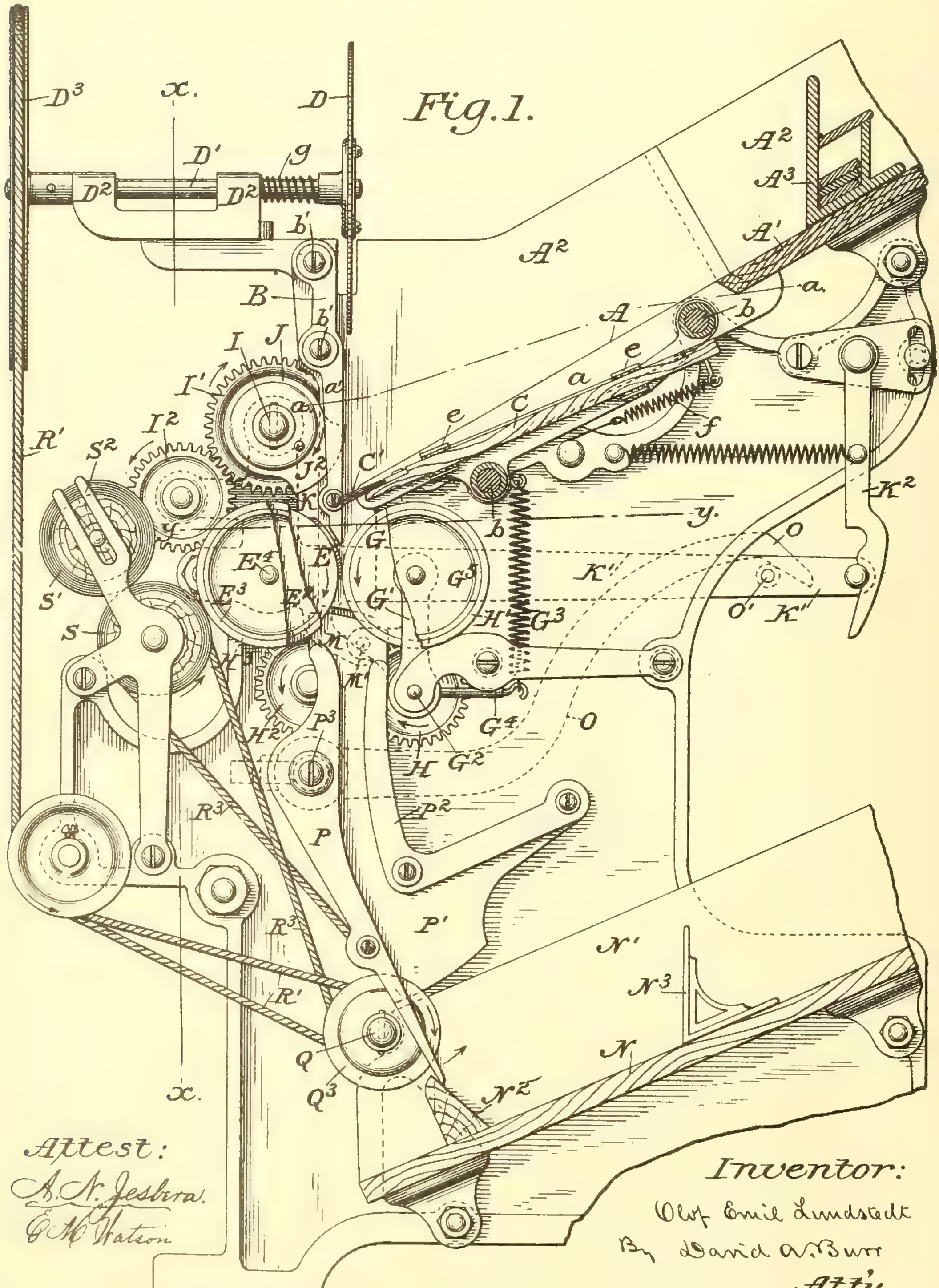
O. E. LUNDSTEDT.

6 Sheets—Sheet 1.

POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig.1.



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(No Model.) 6 Sheets—Sheet 2.

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POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig. 2.

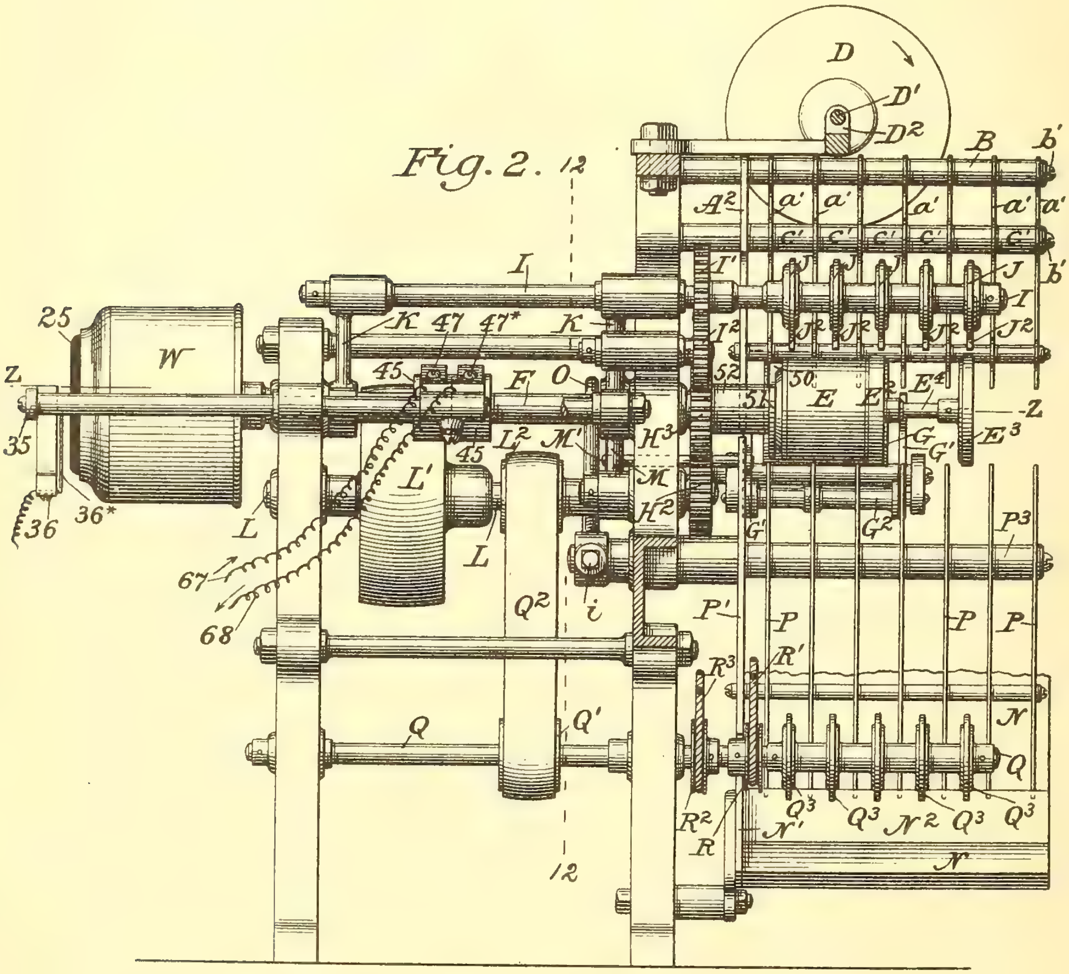
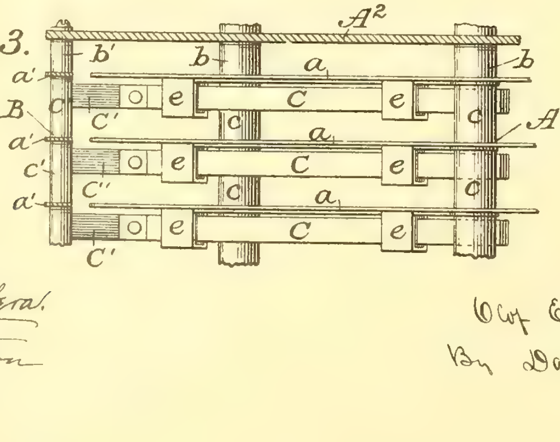


Fig. 3.



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POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig. 4.

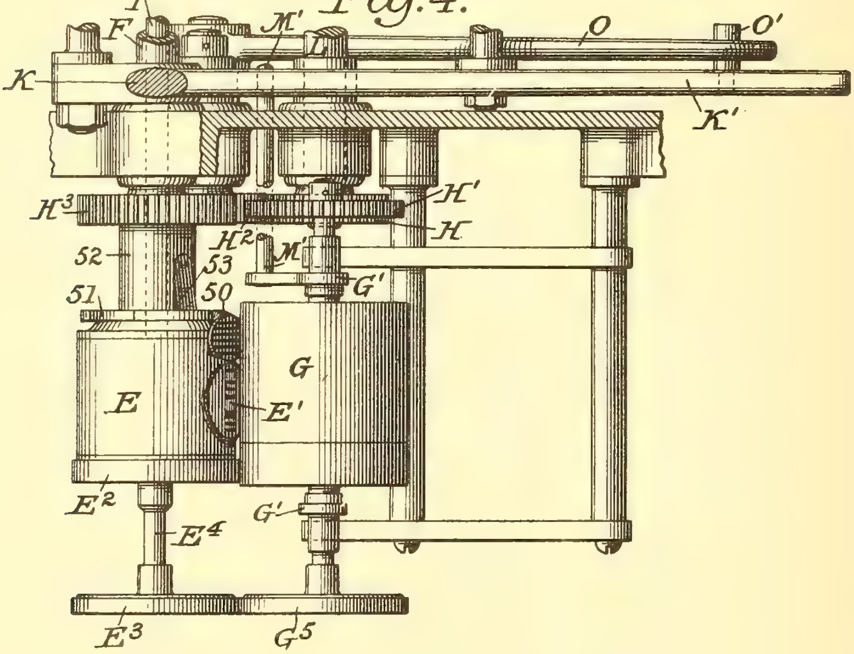
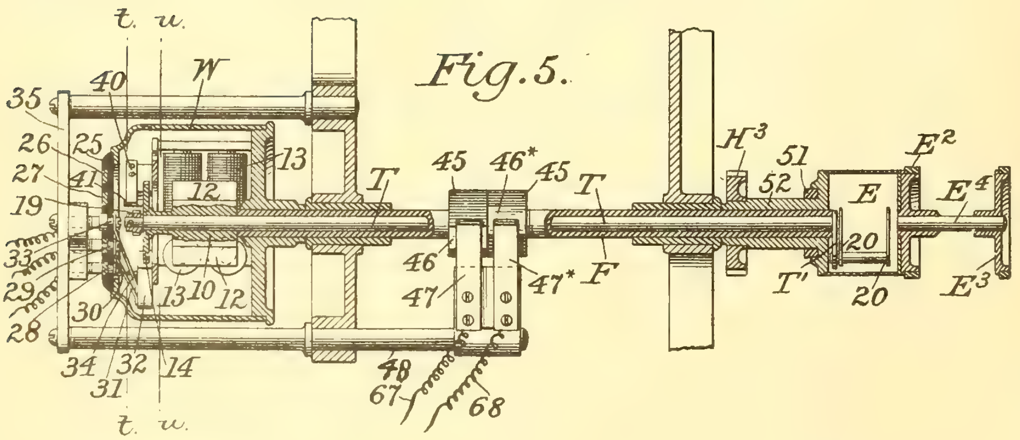


Fig. 5.



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POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig. 6.

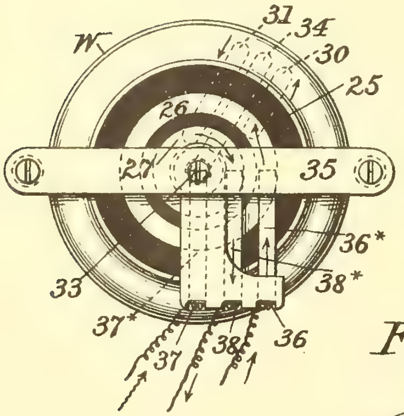


Fig. 7.

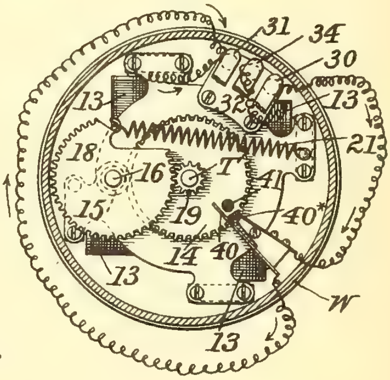


Fig. 8.

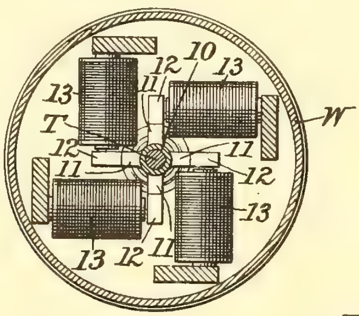


Fig. 9.

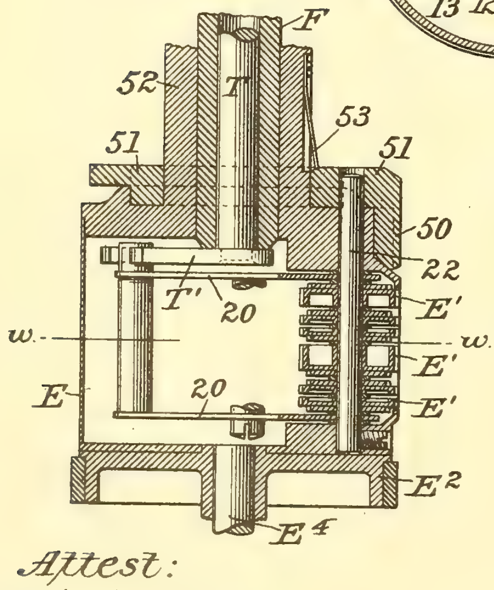
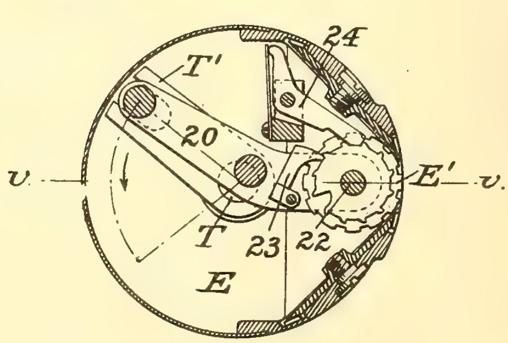


Fig. 10.



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(No Model.) 6 Sheets—Sheet 5.

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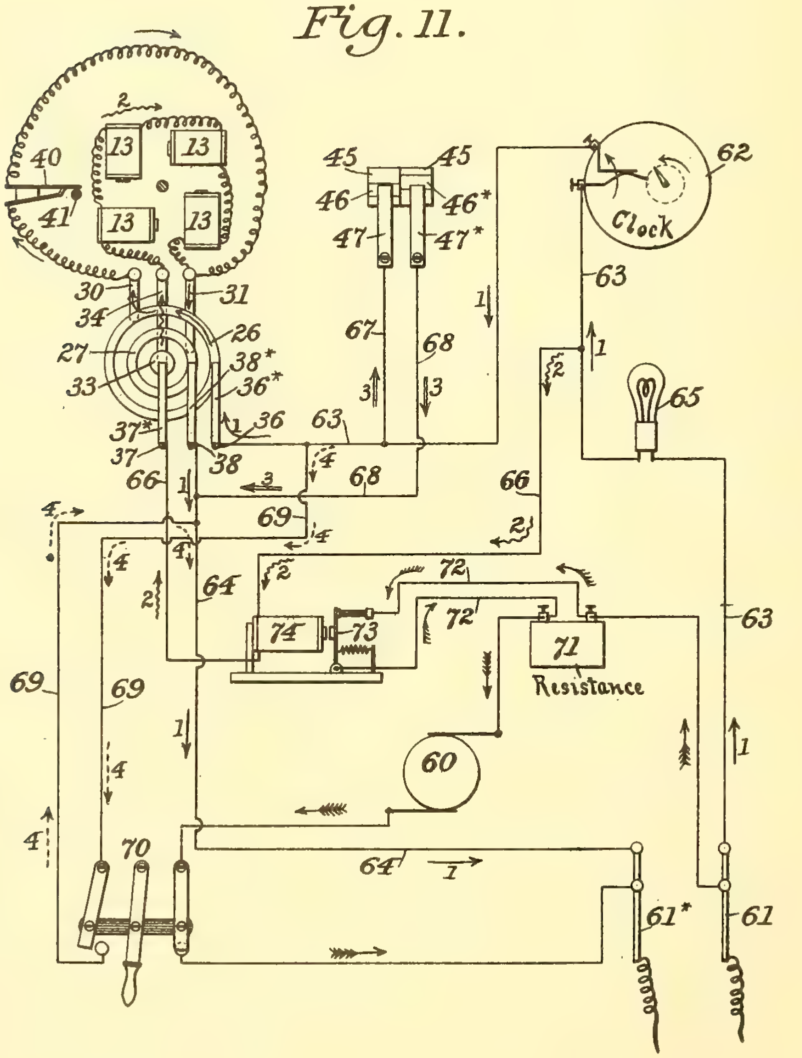
POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig. 11.



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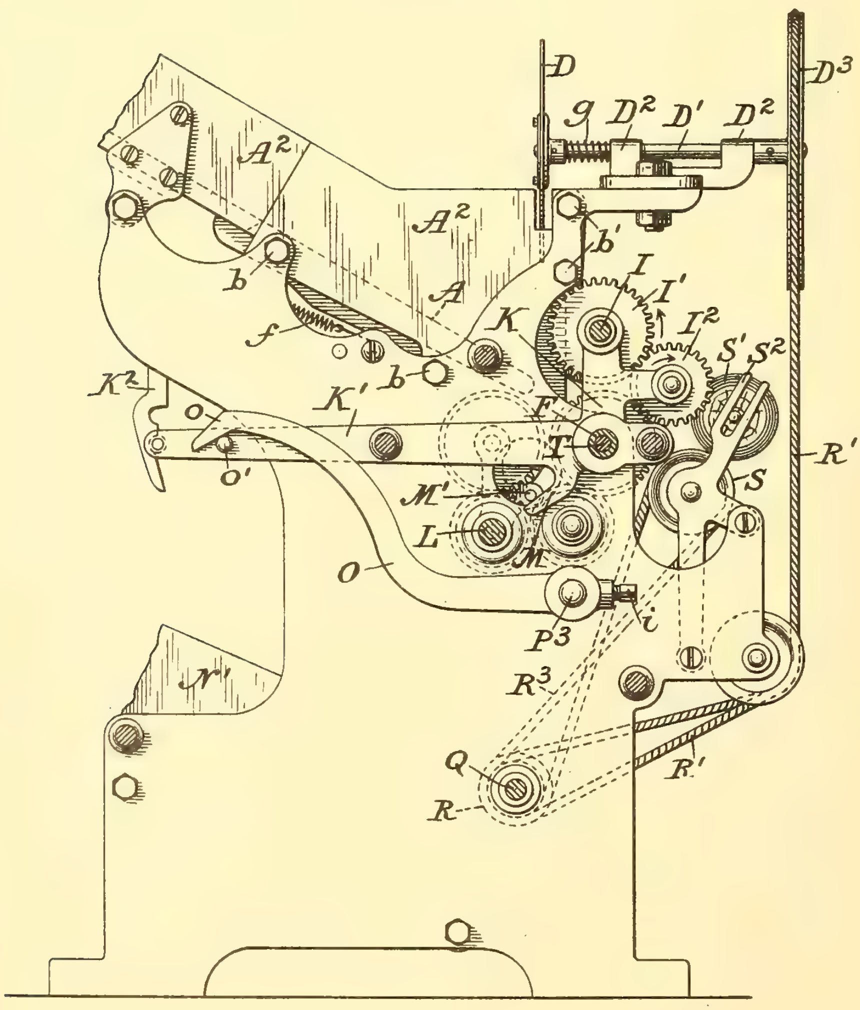
POSTAL DATE AND TIME STAMPING MACHINE.

No. 472,951. Patented Apr. 12, 1892.

Fig. 12.



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A. Widder.

Inventor:
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by William B. Greeley
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UNITED STATES PATENT OFFICE.

OLOF E. LUNDSTEDT, OF BROOKLYN, NEW YORK, ASSIGNOR TO JOHN M. GLOVER, OF ST. LOUIS, MISSOURI.

POSTAL DATE AND TIME STAMPING MACHINE.

SPECIFICATION forming part of Letters Patent No. 472,951, dated April 12, 1892.

Application filed March 27, 1891. Serial No. 386,640. (No model.)

To all whom it may concern:

Be it known that I, OLOF E. LUNDSTEDT, of Brooklyn, in the county of Kings and State of New York, have invented a new and useful Postal Date and Time Stamping Machine; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, making a part of this specification.

My invention relates to an improvement in dating and canceling stamps for letters, and has for its object to provide a machine for use in post-offices which shall automatically print with accuracy and great dispatch upon a number of letters in succession the time and date of imprint, and, if required, simultaneously cancel the postage-stamp upon the letter.

It consists in the combination, in a machine to be driven by an electrical or other motor, of a revolving head carrying date and time printing wheels automatically adjusted at regular intervals by means of a clock, so as to accurately indicate the correct time, a canceling-stamp, feed-rollers, and other devices, substantially as is hereinafter described and claimed, whereby the letters to be stamped, after being placed collectively upon a guideway, are thence carried forward automatically and fed one at a time in proper form and order into position to receive the impress of the printing and canceling devices and thereafter delivered in proper order from the machine.

In the accompanying drawings, Figure 1 is a side elevation of the dating and canceling machine, its motor being omitted from the view. Fig. 2 is a vertical section in line x x of Fig. 1, affording a rear elevation of the principal portion of the machine, some of the parts being broken away to better illustrate underlying details; Fig. 3, a detailed section in line a a of Fig. 1, illustrating the construction of the upper guideway, from which the letters are fed to the machine; Fig. 4, a section through the frame-work on line y y of Fig. 1, affording a plan view of the end of the machine containing the printing and canceling devices; Fig. 5, a horizontal longitudinal section in line z z of Fig. 2; Fig. 6, an end view of the head containing the electro-magnets; Fig. 7, a cross-section of said head in line t t, and Fig. 8 a similar section in line u u of Fig. 5; Fig. 9, a horizontal central section, on an enlarged scale, of the printing-head detached in line v v of Fig. 10; and Fig. 10 a cross-section on same scale in line w w of Fig. 9; Fig. 11, a diagram illustrating the combination and arrangement of the electric motor, time-piece, switch, resistance devices, and electrical connections by means of which the machine is operated. Fig. 12 is a section on the line 12 12 of Fig. 2, looking toward the right.

Similar letters and numerals indicate like parts in all of the figures.

A represents the inclined guideway, upon which the letters, previously assorted so as to bring the superscription and the postage-stamps upon all of them in the same relative position, are placed on edge with their faces to the front. This guideway A is composed of a series of narrow plates a a, set on edge, with narrow open longitudinal intervals between them, forming a grating, which is supported upon transverse rods b b, passing through apertures in the plates, the width of the intervals being determined by means of collars c c of uniform length fitted upon the rods between the plates, as shown in the detail, Fig. 3. The upper end of the inclined grating or open guideway A may be extended by means of a solid wooden or metallic plate A′ of the same width, and its sides are guarded by suitable side plates A^2 A^2. The lower end of the inclined guideway A is brought into close proximity to a vertical wall B in the form of an open grating corresponding with that of the guideway and constructed of the strips a' a', transverse rods b' b', and spacing-collars c' c', as shown in Fig. 2. This wall or grating B projects slightly below the end of the guideway A, and a narrow space is left between the two the entire width of the way to permit of the passage downward of the letters, one at a time, from the end of the guideway. This narrow delivery-space is intersected by the tips of a series of brushes C′ C′, Fig. 1, fitted upon the ends of bars C C, mounted between the plates a a of the in-

clined way, and which are supported to have free longitudinal play in boxes e e, secured between the plates, the same being preferably lined with felt or other soft material to prevent the brush-bars from rattling therein. Each brush-bar C is moved automatically forward by means of a light spring f, so as to carry and hold the tip of its brush lightly in contact with the vertical wall B at the foot of the guideway.

An adjusting-disk D of large diameter is mounted centrally in front of the vertical wall B upon the end of a shaft D′, mounted to rotate in suitable journal-boxes D^2 D^2 immediately above the top of the wall at a right angle with its face, and whose outer end is provided with a suitable driving-pulley D^3. The shaft D′ is left free to have longitudinal play in its bearings, and is automatically carried forward endwise by means of a light encircling spiral spring g, its movement being arrested by the collar or hub of the pulley D^3. The lower half of the disk D is thus made to overlap the wall B, so that the upper ends of the letters carried down upon the guideway toward said wall will rest against the wheel.

A carriage A^3 is mounted to run freely down the inclined guideway A, said carriage being weighted, so as to cause it to carry down before it with an even pressure the letters which are to be stamped and which have been severally placed on edge in front thereof upon the guideway. The carriage thus acts automatically by its gravity to retain the letters in proper place and order and to move them forward against the wall B and the revolving disk D.

The date and time printing wheels E′ E′, Figs. 4, 9, and 10, for the apparatus are mounted within a cylindrical head or casing E upon an axis 22 therein, independent of that of the head. The head is secured to the end of a tubular shaft F, which extends parallel with the wall B below and at the rear thereof. The head is thus made to revolve with the shaft, and at each revolution thereof the peripheries of the printing-wheels contained therein are brought into line of print in the vertical plane of the front face of the wall B and beneath its lower end. (See Fig. 1.)

A suitable impression-roller G, properly faced to serve as a platen for the type on the printing-wheel and whose radius corresponds with the distance of the face of the type on the printing-wheels from the axis of the head in which they are mounted, is mounted immediately opposite the printing-head E, so that a letter-envelope passing between the two shall be thereby carried into contact with the printing-wheels in manner to receive an impression therefrom, Figs. 1 and 4. The bearings for the journal-shaft for the impression-roller G are formed in the ends of parallel arms G′ G′, projecting from a rock-shaft G^2, mounted immediately below the roller in suitable bearings in the frame-work of the machine, and this rock-shaft is oscillated to carry the arms G′ and impression-roller G automatically toward the printing-head E by means of a light spring G^3, attached to a rod G^4, projecting radially from the rock-shaft.

The impression-roller is made to revolve in unison with the printing-head E by means of a pinion H, which gears with a toothed wheel H′, fixed upon one end of the impression-roller, and with a pinion H^2, which gears in turn with a toothed wheel H^3 on the shaft F, which carries the printing-head E. The pinion H is fixed upon the inner end of a driving-shaft L, whose outer end is journaled in a bearing in the outer end of the frame-work by which the machine is supported, as shown in Fig. 2, said driving-shaft being fitted with a driving-pulley or band-wheel L′, by means of which the machine may be geared to its motor.

The contact of the printing-wheels E′ E′ with the impression-roller G is guarded and rendered uniform by means of a circular disk or wheel E^2, fixed upon the outer end of the printing-head E concentric with its axis, and of a corresponding disk or wheel E^3, (see Figs. 2 and 4,) connected and attached to the first at a suitable distance therefrom by a connecting rod or spindle E^4, whose axis coincides with that of the printing-head, the radius of said disks E^2 and E^3 being made equal to the extreme distance of the face of the type on the printing-wheels in the head E from the axis of said head. The inner one of these steadying-disks is made to bear against the periphery of the impression-roller G, which is extended longitudinally to admit thereof, and the outer disk E^3 is made to bear against a corresponding disk G^5, mounted upon an extension of the axial shaft, upon which the roller G is mounted, as shown in Fig. 4, the diameters of said disks and of the roller G being all equal, as above set forth.

In addition to the adjustable date and time printing-wheels E′, carried by the head E, the head is also provided with a device for canceling the postage-stamps upon the letters. This canceling device consists of a plate 50, adapted to make when inked a suitable impression upon the letter, said plate being attached to the head E so as to project slightly from its periphery in a line with and on the same plane as the face of the time-printing wheels, Figs. 2, 4, and 9. The attachment is effected by means of a ring or collar 51, to which the plate is secured and which is made to fit upon a projection or hub 52 at the end of the head in an annular seat or rabbet formed to receive it, as shown in Fig. 9. When placed in its seat and properly adjusted, the ring and canceling-plate are confined by a spring-catch 53, secured to the hub to engage the outer face of the ring.

A shaft I is mounted above and parallel with the shaft F, which carries the printing-head and in the same vertical plane, and is geared to rotate in unison with the shaft F by means of a toothed wheel I′, fixed upon the shaft I to mesh with a pinion I^2, which gears with the toothed wheel H^3 on the shaft

F, Figs. 1 and 2. This feed-shaft I carries a series of disks J J J, fixed thereon at intervals corresponding with the openings between the bars a' a' of the wall or grating B, and which are severally formed each with a segmental peripheral projection J^2 thereon, whose radius corresponds with the distance between the face of the type on the printing-wheels and the axis of the printing-head in which they are mounted, and which at each revolution of the disk will pass between the proximate bars a' a' of the grating B, so as to project slightly beyond the face thereof into contact with the face of the letter-envelope borne against it by the action of the weighted feed-carriage A^3. The feed-shaft I and the shaft F, carrying the printing-head E, are so geared as that the disks J shall move at the same speed and in unison with the printing-head, and their segmental feed projections J^2 J^2 shall pass between the bars a' slightly in advance of the contact of the printing-wheels E' E' with the impression-roller G. The periphery of each of the feed projections J^2 is faced with rubber or felt or its equivalent, so as to produce a frictional contact with the letters carried against it.

The feed-shaft I and the pinion I^2, by which it is geared with the shaft F, are both journaled in a swinging frame K, which is pivoted loosely upon the shaft F beyond or outside of the guideway A for the letters and above the driving-shaft L, as shown in Fig. 2. An arm or lever K' extends from the frame K at its pivotal axis toward the front of the machine, where a pin projecting from said arm is engaged by a latch K^2, which is adapted to secure the levers in two positions. In the one or lower position thereof (see Fig. 1) the feed-shaft I is carried forward to bring the disks J J into an operative position, so that the feed-segments J^2 J^2 may project through the grating. In the other or raised position of the levers the disks J J are carried away from the grating, so as to become inoperative. A toe M, (see dotted lines, Fig. 1,) projecting from the lever-frame K, is also made to contact with a pin M', (see, also, Figs. 2 and 4,) projecting from a bracket on one of the arms G', which carry the impression-roller G in such manner as that when the levers K' are elevated to throw the feed-segments back clear of the slotted wall, and thereby arrest the feed of the letters to the printing-head E, the impression-roller will be made to oscillate upon the rock-shaft G^2, and be thereby swung away from the printing-head, so as to prevent its becoming inked thereby.

A delivery-way consisting of an inclined plate N, preferably arranged to be parallel with the guideway A and having suitable side boards or lateral guards N', is fitted in the frame-work of the machine at a little distance below the impression-roller, and a chute consisting of a grated rear wall P, side plates P', and a grated front wall P^2 is interposed between the lower end of the delivery-way and the under side of the printing-head E and impression-roller G, the top of the rear wall P being placed under the printing-head E a little to the rear of the plane of its contact with the impression-roller G. This rear wall P is in the form of a grating, similar to the wall B in the upper part of the machine.

A rotating shaft Q is mounted immediately above the foot of the delivery-way N and at the rear of the lower end of the grated rear wall P of the delivery-chute, and is geared by a pulley Q' and belt Q^2 to a pulley L^2 on the driving-shaft L, so as to be made to rotate in unison with the upper feed-segments J' J' and the printing-head E. Upon this lower shaft Q is fitted a series of circular disks Q^3 Q^3 at intervals apart corresponding with the openings between the bars of the rear wall P of the chute.

The delivery-chute P P' P^2 is pivoted near its upper end upon a transverse rod or rock-shaft P^3, so that its lower end may rest against the inner side of a transverse ledge or strip N^2 at the foot of the delivery-way N and swing forward therefrom, so as to clear the chute from the feed-disks Q^3 Q^3, and at the same time push forward the letters resting on the way. The oscillation of the delivery-chute, whenever the feed of the letters through the machine is arrested, is produced automatically by means of a lever O, (see Fig. 4 and dotted lines, Fig. 1,) projecting from the rock-shaft P^3, upon which the chute is pivoted, and which is so bent as to carry its forward end alongside the lever K', in position to rest upon a lateral pin O' upon said lever, so that when the lever K' is lifted to throw the feed mechanism out of gear it will also operate to oscillate the delivery-chute in manner as described. This lever O is secured to the rock-shaft P^3 by means of a set-screw i, which permits of its adjustment on the shaft. The periphery of each feed-disk Q^3 Q^3 is faced with rubber, felt, or other soft adhesive fabric, and the shaft Q is so placed in relation to the chute that when the latter is allowed to swing back to its normal position, with its lower end resting against the foot-ledge N^2 of the delivery-way, the peripheries of the disks shall project slightly beyond the face of the rear wall P, and thereby contact with the letters passing down the chute to feed them onward. When the chute is swung forward, it is carried clear of the disks, so that they will no longer operate to move the letters.

The shaft Q is fitted with a pulley R, Fig. 2, carrying a cord R', (see Fig. 1,) by which it is geared to the driving-pulley D^3 of the upper adjusting-disk D in the machine to impart motion thereto. It is also geared by means of a second pulley R^2 and cord R^3 to the inking-rollers for the printing-head. These inking-rollers S S' are journaled in the frame-work of the machine, one above the other, in such position that the lower distributing-roller S shall contact with the type carried by the printing-head E at each revo-

lution of the head, while the upper feed-roller S′ rests by gravity upon the distributing-roller, its journals being to this end fitted in the customary manner in slotted bearing-boxes S^2.

The time and date wheels carried with the printing-head E are actuated by means of a spindle T, extending longitudinally through the tubular shaft F, upon which the printing-head is secured and by means whereof it is revolved. This central spindle T admits of rotation within the shaft F independently thereof and projects into a cylindrical head or casing W, secured upon the outer end of the shaft F to revolve with it.

A sleeve 10 (see Fig. 5) is fitted loosely upon the end of the spindle T within the head W, and from this sleeve four arms 11 11 11 11 (see Fig. 8) are made to radiate at right angles with each other and serving to support the ends of a soft-iron plate 12, fitted and secured upon the arms to extend parallel with the sleeve. Electro-magnets 13 13 are secured within the casing opposite each of the four soft-iron plates 12, each plate being thus made to serve as an armature for the magnet, its movement to and from the magnet being in the arc of a circle, having the spindle T as its center and operating to produce an oscillating rotatory movement of the sleeve 10 upon the spindle. This oscillating movement of the sleeve 10 about the spindle T as its axis is communicated, greatly enlarged, to the spindle itself by means of a train of gearing consisting of a large toothed wheel 14, (see Fig. 7,) fixed upon one end of the sleeve, or of the frame carried by the sleeve, to gear with a small pinion 15 upon an arbor 16, revolving in fixed bearings provided for it within the head W, and which carries, also, a large toothed wheel or segment 18, which meshes with a small pinion 19 on the end of the spindle T. Thus a slight oscillation of the arms 11 11, carrying the armatures 12 12, is made by means of said gearing to produce a rocking movement of the spindle T of sufficient amplitude to impart to an oscillating pawl-frame 20, (see Figs. 5, 9, and 10,) secured to the opposite end of said spindle within the printing-head E, the extent of movement required for actuating the time and date wheels. The armatures 12 12 are automatically retracted from the magnets by means of a spring 21, which may be attached, as shown in Fig. 7, to the periphery of the toothed wheel or segment 18 in the above-described gearing.

The date and time printing wheels E′ E′ revolve upon a shaft 22, which is fitted within the head E, parallel with but at one side of the shaft F, upon which the head revolves. They are operated in the customary manner by means of pawls 23, carried by the oscillating frame 20, (see Fig. 10,) which is actuated, as described, by the oscillation of the central spindle T under the action of the magnets 13 13, the spindle T being connected with the frame 20 by a radial arm T′, which engages loosely at its outer end the outer end of the frame. A reverse movement of the printing-wheels is prevented, as usual, by a spring-actuated pivoted dog 24.

The magnets 13 13 are excited and brought into action at regular intervals by the movement of a suitable time-piece, which operates to make and break in the customary manner an electric circuit in which the magnets are included. The connection of this circuit with the magnet is obtained by means of a circular end plate or disk of insulating material 25, (see Figs. 5 and 6,) covering the outer end of the head W and fixed thereto to revolve with it and in whose outer face are inlaid or inserted two metallic rings 26 27, each of which is placed in electrical connection by means of transverse pins 28 and 29, passing through the insulating-disk 25, with metallic conducting tongues or strips 30 31, (see Figs. 5 and 7 and dotted lines, Fig. 6,) which project from a block or plate 32 of rubber or other insulating material secured within the head W. A third conducting-pin 33 is inserted through the center of the insulating end plate 25, and is made to contact with a third conducting tongue or strip 34, attached to the insulating-block 32.

A cross-bar 35 is secured to the frame-work of the machine to extend diametrically across the outer face of the insulating end plate 25 at a short distance therefrom, and three insulated binding-screws 36, 37, and 38 are fitted in said cross-bar to connect severally with elastic tongues 36*, 37*, and 38* of thin metal, which are made to bear, respectively, with a constant pressure, the one 37* against the central conducting-pin 33 (see dotted lines, Fig. 6,) and the other two against the two concentric rings 26 and 27 of the revolving end plate, so that the electrical connection between the outer binding-screws 36, 37, and 38 and the conducting-strips 30, 31, and 34 remains constant during the revolution of the head and its magnets.

The conducting-strips 31 and 34 (see Figs. 6 and 7) are connected by suitable wires with the coils of the magnets 13 13, and these are all included in one circuit. The third conducting-strip 30 is connected with a wire extending in a loop to the conducting-strip 31 to form a circuit, which is controlled by a spring-plate 40, included therein, and whose elasticity operates normally to form a contact with an opposite plate 40* to close the circuit. This circuit-closer is fixed within the head W to revolve with it, and its spring-plate is so disposed with reference to the radial arms 11, supporting the armatures 12, that an insulated pin 41, (see Figs. 5 and 7,) projecting from the toothed wheel 14, shall extend into such close proximity and relation to the spring that when the arm is oscillated by the closing of the armatures the pin will operate to move the spring 40 away from its contact-plate 40*, and thus break the circuit established through it. As the oscillation of the armatures 12 12 produces the movement of

the date and time wheels E′ E′, it follows that the circuit is opened during the movements of said wheel and again closed when the movement is completed.

The collars of insulating material 45 45 are fitted side by side in contact at any suitable point upon the shaft F, and are secured thereto by set-screws to revolve with it. Each carries upon its periphery a transverse metallic strip or plate 46 46* in such manner that the inner ends of the plates on the two collars may be brought into close electrical contact. By turning either collar an adjustment of the two plates 46 46* relatively to each other and to a line parallel with the axis of the shaft may be obtained, so that the edge of one of the plates may be placed more or less in advance of the corresponding edge of the other plate without breaking the contact of their ends.

Electrical conducting springs or tongues 47 47* are secured to an arm 48, extending for support from the frame-work of the machine parallel with the shaft F, in position to permit the outer ends of the tongues to rest severally, each upon one of the transverse plates on the collars, whereby an electrical circuit may, for a purpose to be hereinafter described, be closed from the one tongue 47 through the two contacting plates 46 46* to the other tongue 47* at each revolution of the shaft, the relative duration of contact being determined by the relative adjustment of the plates. The insulating-collars 45 are so adjusted upon the shaft F that the tongues rest upon the conducting-plates, so that a circuit may be closed through them at the moment when the printing-wheels are at line of print and an impression is being taken therefrom. By the time this has been accomplished the continued revolution of the shaft will carry the plates from under the tongues, allowing the latter to rest upon the insulating-collars, and thereby breaking the circuit through them. The duration of the time during which the circuit will remain closed through the plates and tongues is readily adjusted by turning one of the collars independently of the other until the front edge of its plate is more or less in advance of that of the plate upon the other collar.

The machine is driven by an electrical motor 60 of any approved description, (see the diagram Fig. 11,) to be operated by a current from a dynamo or from a central electrical station, the connections or binding-posts for which are represented by 61 61* in said diagram. The motor 60 is geared by a belt to the driving-pulley L′ of the machine.

The date and time wheels E′ are adjusted automatically once every minute or at other measured intervals of time by means of a clock 62 of any approved description, which is fitted in the customary manner with a device for opening an electric circuit in a shunt from the main dynamo-circuit by the wires 63 64. This circuit extends from the one binding-post 61 by means of the wire 63 to the make-and-break device in the clock 62, thence to the binding-screw 36 of the head W, containing the electro-magnets by which the printing-wheels are adjusted, thence through the connecting-strips 36*, 26, and 30, and the switch 40 and its connecting-wires to the strip 31, thence through the strips 31 27 to the binding-screw 38, and thence by the conducting-wire 64 to the binding-post 61*, which completes the circuit. This circuit is protected from undue tension by an incandescent lamp 65 or other form of resistance device included therein. It is normally closed, and when opened by the movement of the clock at each minute or other predetermined interval the current is allowed to follow a shunt-circuit through a wire 66, connected near the clock to the wire 63, and which extends thence to the binding-screw 37 of the head W, and through the conducting-strips 33 and 34 to the coils of the several electro-magnets, which are thereby all connected in circuit, and thence to the conducting-strip 31, through which and its connections with the return-wire 64 the circuit will be completed back to the binding-post 61*. The shunt-circuit is of greater resistance than the first circuit and normally little current flows over it; but when at each break of the first circuit by the clock the entire current is compelled to flow over the shunt circuit the electro-magnets 13 13 are thereby brought into action to move the armatures 12 12 and thereby retract, in manner as hereinbefore described, the pawls, by whose return movement under the stress of the spring governing them the minute-wheel of the time indicating and printing mechanism is actuated. As the armatures are attracted by the magnets their movement will operate, by means of the insulated pin 41, to open and hold open the switch 40 until they are released by the close of the main clock-circuit, which, however, will now be held open at the switch after it has been closed at the clock until, as will be presently explained, it is automatically closed by the closing of a shunt-circuit formed by the contact of the tongues 47 47* with the plates 46 46* on the insulating-disks 45 45, fitted upon the shaft F, carrying the printing-wheels, said plates being so adjusted on the shaft as to close said shunt-circuit so soon as the printing-wheels have made their impression and are free to be moved. This shunt-circuit is formed by means of a wire 67, connecting the wire 63 of the clock-circuit with the tongue 47, and a second wire 68, connecting the tongue 47* with the wire 64 of the clock-circuit. It is thus made impossible for the date and time wheels to be moved so long as they are in position to make an impression; but if the action of the clock by which their movement is mediately effected occurs at the time when an impression is being made the action of the pawls by which they are actuated is suspended until the wheels have moved out of line of print.

To guard against an intermission in the

movement of the date and time wheels during a stoppage of the machine, when by chance the tongues are left resting upon the insulating-disks 45 instead of upon the conducting-plates 46 46* on said disks, a third shunt-circuit is provided in connection with the switch, by means of which the electric motor by which the machine is driven is thrown in and out of circuit, so that the action of the switch in cutting out the motor and stopping the machine will close said auxiliary shunt. This third auxiliary shunt is obtained by connecting the wire 63 in the main clock-circuit and the wire 64 by means of wires 69 69 with the switch 70, in manner substantially as shown in Fig. 11, whereby if a stoppage of the motor occurs when the shunt through the wires 67 and 68 is open the shunt through the wires 69 will be closed as a substitute therefor, so as to permit the release of the magnets to operate the date and time wheels at the proper moment in manner as described.

To facilitate the proper movement of the time-wheels by the action of the clock and of the magnets brought into circuit thereby during the movement of the machine at its highest rate of speed, a resistance-box 71 is placed in the circuit between the dynamo or source of electrical supply at 61 61* and the motor 60, and a short circuit 72 is provided for the current around this resistance-box, to be closed by the contact of a spring carrying the armature 73 of a relay-magnet 74, whose coil is included in the second shunt-circuit between the clock and the head W, formed by the wire 66, so that when the time-controlling circuit is broken by the movement of the clock to cause a movement of the time-wheels the magnet 74 of the relay will be excited, and the consequent movement of its armature will operate to break the short circuit 72, and, by throwing the resistance-box 71 into the motor-circuit, cause the motor to slow up until the clock-circuit is closed again.

In the operation of the machine the letters to be stamped or impressed are placed on edge on the guideway A, all facing toward the wall B, with the postage-stamps thereon in the upper corner, next to the disk D, so as to be forced and fed toward the wall and disk with a constant gentle pressure by the weight of the carriage A^3, bearing against them. The foremost letter will be moved laterally by its contact with the disk D, so as to be carried evenly against the side wall of the guideway, by which movement all the letters are brought into the same relative position with regard to the printing-wheels beneath. At each revolution of the disks J′ the feed-segments J^2 come into play to bear against the face of said foremost letter, and by frictional contact therewith force it down past the brushes C′, which offer but slight resistance thereto, and into position to be caught between the printing-head E and impression-roller G, which in their revolution will draw the letter down between them and deliver it into the chute P beneath them. In passing between the printing-head and impression-roller the letter will receive an imprint from the time-wheels of the exact date and time of the impression, and its postage-stamp will be at the same time cancelled. Reaching the lower end of the delivery-chute, the letter will be forced in behind that which preceded it by the action of the revolving rubber-faced disks Q^3 Q^3 bearing upon it, and as each successive letter is thus inserted at the foot of the delivery-way N those in front will be forced in regular order up said delivery-way, being kept in due form by means of a light carriage N^3, placed upon the way. While the letters are thus passing through the machine the time-wheels E′ in the printing-head E, by which each letter is imprinted with the date and hour of impression, are automatically moved, to indicate accurately the time, by the intermittent action of the pawls in the head E, occasioned by the intermittent vitalization of the magnets 13 13 in the head W, caused by the make and break at regular intervals through the action of a clock 62, and in manner as hereinbefore described of an electric circuit including said magnets. It is obvious that in the normal operation of the machine the printing-head E rotates much more rapidly than the time-wheels are changed and that many letters are stamped in one minute, if that be the unit of time adopted in which said wheels are to be actuated.

I claim as my invention—

1. The combination, in a postal date and time stamp, of an inclined way, a slotted wall extending across the lower end thereof, leaving an intervening opening, a follower moving automatically down the way, devices for propelling in a direction parallel with the face of the wall the letter-envelopes pressed against it, so as to produce their delivery at its lower end, and a disk revolving in a plane parallel with the face of the wall and overlapping a portion of its upper end, substantially in the manner and for the purpose herein set forth.

2. The combination, in a postal date and time stamp, of an inclined way, a transverse wall at the foot thereof, devices for propelling in a direction parallel with the face of the wall the letter-envelopes pressed against it to produce their delivery at its lower end, and spring-actuated bars movable at right angles to the face of the wall and terminating in elastically-yielding tips to contact lightly against the lower end of the wall under the foot of the inclined way, substantially in the manner and for the purpose herein set forth.

3. The combination, in a postal date and time stamp, with its revolving printing-head and its opposite impression-roller, of an inclined delivery-way beneath said roller, a slotted or grated chute interposed between the lower end of the inclined way and the printing-head, and revolving disks mounted at the

rear of the slotted chute to project severally through the slots therein, whereby the envelopes passing down the chute are fed forward by contact with the peripheries of said disks, substantially in the manner and for the purpose herein set forth.

4. The combination, in a postal date and time stamp, with its revolving printing-head and its opposite impression roller, of a pivoted slotted or grated delivery-chute whose upper end stands normally in position beneath said head and roller to receive the envelopes delivered therefrom, a rotating shaft mounted at the rear of the lower end of the chute, and disks fitted upon said shaft in position to project through the bars of the chute when it is in its normal position and be clear therefrom when the lower end of the chute is swung forward, substantially in the manner and for the purpose herein set forth.

5. The combination, in a postal date and time stamp, with an inclined way and a transverse slotted wall at the foot thereof, leaving a narrow open interval between the two, of a rotating shaft mounted in a pivoted frame at the rear of the wall to oscillate to and from it, disks mounted on said shaft having peripheral projections adapted to pass through the slots in the wall when the frame is swung toward it and to be clear thereof when the frame is swung back, an arm extending from the swinging frame to operate it, and a catch to confine said arm, substantially in the manner and for the purpose herein set forth.

6. The combination, in a postal date and time stamp, with an inclined receiving-way, of a grated wall at the lower end thereof, leaving a narrow open interval between the two, an oscillating frame at the rear of said wall, a shaft revolving in said frame, carrying feed-segments to revolve between the bars of the grated wall, an arm or lever operating the swinging frame, whereby it is caused to swing to and from the wall, a revolving printing-head, an opposed impression-roller, a swinging frame in which said impression-roller is mounted, a spring carrying said roller against the printing-head, and a finger extending from the swinging frame, carrying the impression-roller into position to be engaged by the lever actuating the swinging frame which carries the revolving feed-segments, whereby when said segments are swung back from their operative position the impression-roller will be swung clear of the printing-head, substantially in the manner and for the purpose herein set forth.

7. The combination, in a postal date and time stamp, with an inclined receiving-way, of a grated wall at the lower end thereof, leaving a narrow open interval between the two, an oscillating frame at the rear of said wall, a shaft revolving in said frame, carrying segments to revolve between the bars of the grated wall, an arm or lever operating the swinging frame, whereby it is caused to swing to and from the wall, a revolving printing-head and its opposite impression-roller mounted below the end of the receiving-way, an oscillating chute mounted below said head and roller, feed-disks mounted upon a shaft at the rear of the chute to project through the slots in the chute when the latter is in its normal position, and an arm projecting from said chute into engagement with a pin upon the arm or lever governing the swinging frame carrying said feed-disks, whereby when the segments are swung away from the slotted wall of the upper inclined way the delivering-chute will be swung away from its feed-disks, substantially in the manner and for the purpose herein set forth.

8. The combination, in a postal date and time stamp, with its revolving printing-head, of the detachable collar encircling one end thereof, the spring confining said collar, and the canceling plate or stamp carried by said collar, substantially in the manner and for the purpose herein set forth.

9. The combination, in a date and time stamp, with the printing-head mounted on a tubular rotating shaft, of an arbor mounted within the head parallel with the shaft and at one side thereof, a printing-wheel mounted to revolve upon said arbor, a ratchet-wheel actuating the printing-wheel, a rock-shaft extending into the head through its tubular shaft, an arm projecting radially within the head from the rock-shaft, and an oscillating pawl actuated by the movement of said arm to engage the ratchet-wheel, substantially in the manner and for the purpose herein set forth.

10. The combination, in a date and time stamp, of a tubular shaft, a central rock-shaft inclosed within the tubular shaft to revolve with it and oscillating independently thereof, a head attached to and revolving with the tubular shaft, indicating mechanism revolving independently upon a lateral shaft fixed in said head to move with it, and an oscillating frame mounted within the head to actuate the indicating mechanism and itself actuated by the independent movement of the rock-shaft, substantially in the manner and for the purpose herein set forth.

11. The combination, in a time-stamp, of a revolving head and time-indicating wheels mounted within the head to revolve independently thereof, substantially in the manner and for the purpose herein set forth.

12. The combination, in a time-stamp, of a revolving head, revolving time-printing wheels mounted within the head upon an independent axis and whose type-faces are brought to line of print through an opening in the head, and an opposite impression-roller serving as a platen for the printing-wheels at each revolution of the head, substantially in the manner and for the purpose herein set forth.

13. The combination, in a time-stamp, of a revolving head, an opposite revolving impression-roller contacting with the head, time-

printing wheels revolving independently in the head upon an independent axis and brought to line of print against the impression-roller by the revolution of the head, and devices for feeding letter-envelopes in between the head and impression-roller to be carried forward by their revolution, substantially in the manner and for the purpose herein set forth.

14. The combination of a tubular shaft, the head or casing attached to the end of the shaft to revolve with it, a shaft rocking independently within the tubular shaft and projecting into the head, a wheel and intermediate devices whereby the type-wheel is rotated by the rocking of the shaft, a loose sleeve upon the end of the rock-shaft, a pinion fixed to said sleeve and geared mediately to the rock-shaft, an arm projecting radially from said sleeve within the head, an armature attached to said arm, an electro-magnet fixed to the head in position to attract said armature, and a spring to retract it, whereby the rock-shaft is oscillated by the action of the magnet while revolving in unison therewith about a common axis, an electric circuit connected with the magnet, and a make-and-break mechanism included in said circuit, substantially in the manner and for the purpose herein set forth.

15. The combination, in a time-stamp, of a revolving head, time-wheels revolving within said head upon an independent axis, a rock-shaft projecting into the head coincidently with its axis, intermediate mechanism for actuating the time-wheels, an electro-magnet and intermediate mechanism for actuating the rock-shaft, said magnet revolving in unison with the head, an electric circuit, a clock-movement included therein and operating to make and break the circuit at regular intervals, and a shunt including said magnet, substantially in the manner and for the purpose herein set forth.

16. The combination, in an electro-magnetic time-stamp, of a revolving head, time-wheels revolving independently within said head, a rock-shaft projecting into the head coincidently with its axis, intermediate mechanism for actuating the time-wheels from said shaft, an electro-magnet and intermediate mechanism for actuating the rock-shaft, said magnet revolving in unison with the head, means for moving the rock-shaft in opposition to the magnet, a clock-movement included in an electric circuit and operating to make and break the circuit at regular intervals, an automatically-closed switch in said circuit, a device operated by the armature of the magnet to open the switch, and a shunt-circuit from the clock-controlled circuit of greater resistance than said clock-circuit and in which the magnet is included and through which the current will be diverted when the clock-circuit is opened, a normally-open shunt of low resistance about said magnet, and means to close said shunt, substantially in the manner and for the purpose herein set forth.

17. The combination, in an electro-magnetic time-stamp, of a revolving printing-head, time-printing wheels revolving independently within said head, a rock-shaft projecting into the head coincidently with its axis, intermediate mechanism for actuating the printing-wheels from said shaft, an electro-magnet and intermediate mechanism for actuating the rock-shaft, said magnet revolving in unison with the head, a clock-movement included in an electric circuit and operating to make and break the circuit at regular intervals, an automatically-closed switch in said circuit, a device operated by the movement of the armature of the magnet to open the switch, a shunt-circuit from the clock-controlled circuit of greater resistance than said clock-circuit and in which the magnet is included and through which the current will be diverted when the clock-circuit is open, conducting-wires forming a short circuit from the clock-circuit, and a circuit-closing device included in said short circuit and mounted to revolve in unison with the printing-head, whereby the short circuit will be closed when the printing-wheels are at line of print, substantially in the manner and for the purpose herein set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

OLOF E. LUNDSTEDT.

Witnesses:

A. N. JESBERA,

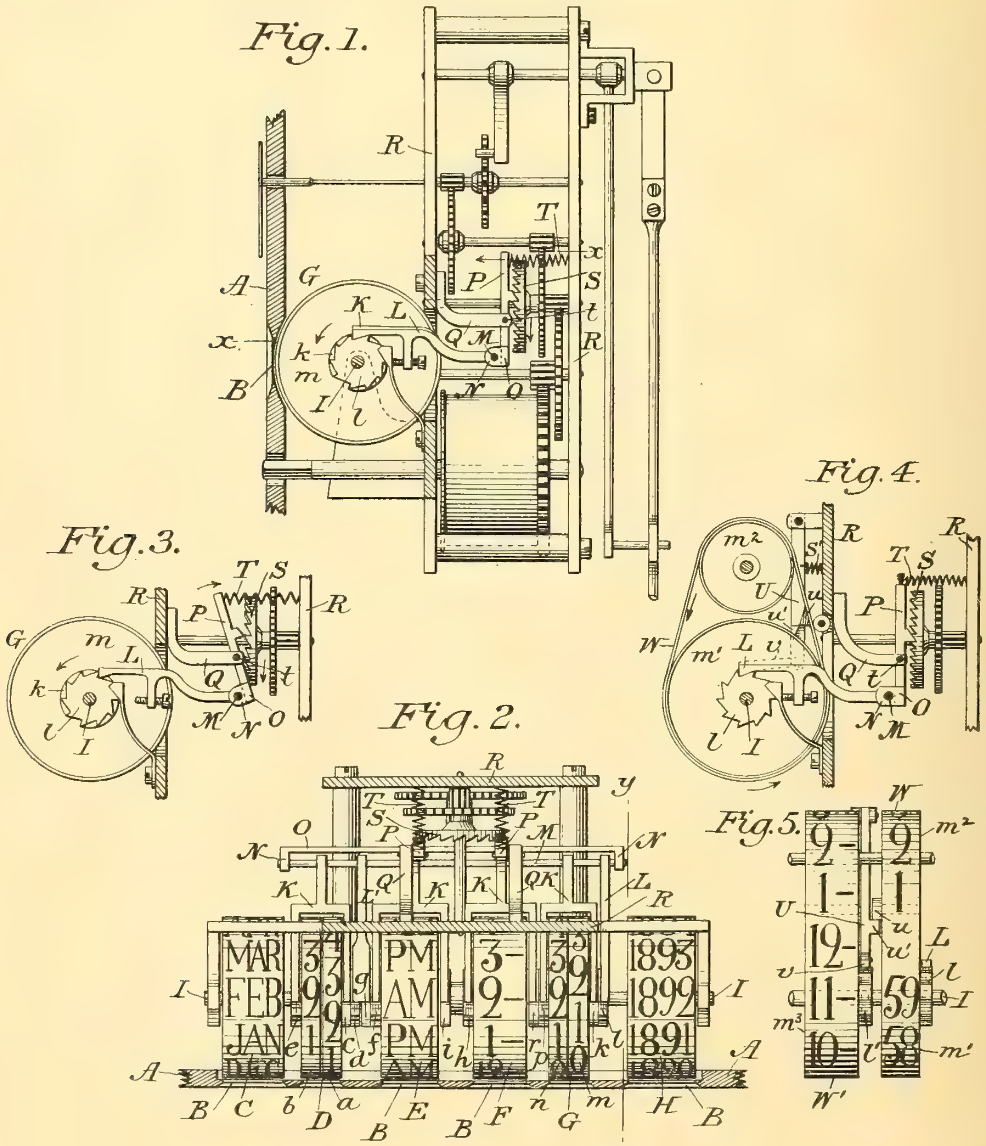
A. WIDDER.

(No Model.)

W. B. MARTINDALE & E. R. MALMBORG.

CALENDAR CLOCK.

No. 472,952. Patented Apr. 12, 1892.



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CALENDAR-CLOCK.

SPECIFICATION forming part of Letters Patent No. 472,952, dated April 12, 1892.

Application filed December 30, 1889. Renewed October 14, 1891. Serial No. 408,654. (No model.)

To all whom it may concern:

Be it known that we, WARREN B. MARTINDALE, of Kenosha, in the county of Kenosha and State of Wisconsin, and ERNST R. MALMBORG, of the city of St. Louis, in the State of Missouri, have invented certain new and useful Improvements in Calendar-Clocks; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to an improvement in calendar-clocks, and has for its object to provide at low cost in a neat simple form a time-calendar which will indicate and clearly expose to view in proper order and in the same right line the year, the month, the day of the month, and the time of day.

It consists in the novel combination and arrangement of devices, substantially as hereinafter described and claimed, for actuating a series of date and time indicating wheels, all mounted to revolve independently and in proper order upon the same horizontal axis.

In the accompanying drawings, Figure 1 is a vertical section in line *y y* of Fig. 2, representing a side elevation of the time mechanism and indicating-wheels with the casing, excepting a portion of the front plate, broken away. Fig. 2 is an irregular section in line *x x* of Fig. 1 with a portion of the time mechanism omitted; Fig. 3, a detached view of one end of the indicating-wheels in same section as Fig. 1, illustrating the movement of the mechanism operating the same. Fig. 4 is a detached view similar to Fig. 3, illustrating a modification of the invention, in which endless bands are substituted for the indicating-wheels; and Fig. 5, a front view of said bands.

Similar letters indicate like parts in all the figures.

A represents the front plate of a case of any suitable form and design to inclose the improved mechanism; B B B, a series of sight-openings pierced in a straight horizontal line through said front plate.

C D E F G H are the date and time indicating wheels for the calendar, all of which are mounted to revolve freely and independently on a horizontal shaft I, fixed in the case parallel with its front plate and in position to permit the characters on the periphery of each wheel to be read through one of the sight-openings B. The outer wheel C at the left in the series (see Fig. 2) bears upon its periphery the names of the months and the outer wheel H at the right bears upon its periphery a corresponding series of figures indicating a succession of years. These two wheels are adapted to be turned by hand for adjustment, as required. Of the intermediate wheels the date-wheel D, next to the right of the month-wheel C, is formed in two divisions *a* and *b*, revolving independently closely side by side, the first *a* being divided into ten peripheral spaces bearing thereon the nine digits and a cipher, and the second *b* into twelve peripheral spaces bearing the numbers "1" "2" "3" repeated in three series with blank spaces between each series. The first division *a* carries at its right, to revolve with it, first, a disk *c*, having a single peripheral notch, and, second, a ratchet-wheel *d*, of like diameter, having ten teeth, and the division *b* carries upon its left to revolve with it, a ratchet *e*, having twelve teeth. The periphery of the meridian-wheel *e*, mounted next to the right, is divided into twelve peripheral spaces, bearing thereon the letters "A. M." and "P. M." alternately, and said wheel carries on its left, to revolve with it, first a ratchet *f*, having twelve teeth, and next a disk *g*, of like diameter, having six peripheral notches. The hour-wheel F next to the right is divided peripherally into twelve spaces, bearing, respectively, the numbers "1" to "12," each followed by a dash, and it carries upon its hub to the left a ratchet-wheel *h*, having twelve teeth, and a disk *i*, of same diameter, having a single peripheral notch. Lastly, the minute-wheel G, between the hour-wheel F and year-wheel H, is formed in two divisions *m n*, revolving independently closely side by side, like the date-wheel D. The first division *m* on the right carries upon its periphery in ten equal spaces the nine digits and a cipher, and the second division *n* is divided peripherally into twelve spaces bearing, respectively, the figures "1" to

"5" and a cipher repeated in two series. The first or units division m carries upon its hub, to revolve with it on the right, first, a disk k, having a single peripheral notch, and, second, a ratchet-wheel l, of the same diameter, having ten teeth, while the second or tens division n carries upon its hub, to revolve with it on the left, first a ratchet-wheel p, having twelve teeth, and next a disk r, of the same diameter, having two peripheral notches.

The disks and ratchets carried by the indicating or calendar wheels all correspond in diameter.

The ratchets of the wheels E, F, and G are severally engaged each by one arm of a bifurcated pawl K, whose other arm rests upon the periphery of the disk revolving with the next wheel to the right, so that each pawl is held out of engagement with its ratchet until the arm thereof, resting upon a disk, drops into a peripheral notch on said disk. Single pawls L L′ are in constant engagement, the one with the ratchet l of the first or units division m of the minute-wheel G and the other L′ with the disk g of the meridian-wheel, said second pawl being made to overlap, also, and engage, as permitted, the ratchet d of the first division of the date-wheel. These single pawls, together with the several bifurcated pawls K K, are all pivoted upon a transverse rod M, extending parallel with the axis of the indicating-wheels at the rear thereof. The ends of this rod M are pivoted between ears or lugs N N, projecting from a parallel bar O, which is carried upon the lower ends of two vertical levers P P, pivoted at t to brackets Q Q, projecting from the frame-work R, in which the time mechanism is mounted. Hence the oscillation of these levers, by causing the rod M to swing back and forth to and from the indicating-wheels, will cause the pawls to reciprocate in manner to actuate said wheels. The rod M and the pawls pivoted thereto are thus oscillated once each minute by means of a crown ratchet-wheel S, having sixty teeth, against which a counterpart tooth on the upper arm of each lever P is held by means of a suitable spring T. This crown ratchet-wheel S revolves once in every hour, being fixed upon the shaft carrying the hour-wheel in a clock-movement of any approved construction, having a spring of special strength adapted to actuate the several movements, as above described.

In the operation of the device the revolution of the contrate-wheel S in the clock-movement will produce each minute a reciprocating movement of the pawls L and K K K, actuating the time-indicating calendar-wheels. The pawl L, being in constant engagement with ratchet l of the units-division m of the minute-wheel G, will cause it to move one step each minute and at the tenth minute the single notch in the periphery of the disk k, revolving with said ratchet, will permit the bifurcated pawl K of the second or tens division n of the minute-wheel G to drop into engagement with its ratchet, whereby it will be moved one step at the next movement of the pawls, so as to bring the appropriate tens figure for the second place in the minutes into sight. In like manner, when the tens minute-wheel n has made a revolution, the notch on the periphery of the disk r, revolving therewith, will be brought into position to allow the bifurcated pawl for the hour-wheel F to engage the ratchet on said wheel and move it one step, and thereby indicate the change in the hour, and by similar means, as described, the meridian-wheel E will be moved one step each twelve hours and the date-wheel D once every twenty-four hours.

To avoid complication in the mechanism, the date-wheel may be adjusted by hand on the first day of each month.

As a modification of our calendar, an endless band W, of sufficient length to admit of bearing clearly upon its surface the sixty numbers indicating the minutes, may be carried over a wheel m' (see Fig. 4) to be actuated by means of the reciprocating movement of the pawl L, engaging the ratchet-wheel l, secured laterally to said wheel m', the upper end of the band being carried over a suitable idle-roller m^2, mounted above it. In such case similar bands W′ (see Fig. 5) are provided for the hours, the meridian-signs, and the days of the month, each being actuated at the appropriate interval by means of an inclined-faced lug u, (see Figs. 4 and 5,) adapted to engage a counterpart inclined-faced lug u' upon the proximate face of a pendulous pawl-lever U, carrying a pawl v, (see dotted lines, Fig. 4,) engaging a ratchet l' on the proximate band-wheel m^3, so that the ratchet shall be pushed forward to move the wheel as the two lugs are made to slide one over the other, as is illustrated in Fig. 4, in which said lugs are shown at the moment they are about to separate, the pawl v having been pushed forward to the extreme length of its stroke. The pawl is retracted automatically by the stress of a spring S′, attached to the pawl-lever U.

We claim as our invention—

The combination, in a calendar-clock, of a time-train, a contrate ratchet-wheel upon its hour-spindle, a pivoted lever having a beveled tooth on one arm engaging the inclined teeth of the ratchet, a spring enforcing said engagement, a pawl pivotally connected to the opposite end of said lever to reciprocate with it, and a date and time indicating device actuated by said reciprocating pawl, substantially in the manner and for the purpose herein set forth.

In testimony whereof we have hereto signed our names in the presence of two witnesses.

WARREN B. MARTINDALE.
ERNST R. MALMBORG

Witnesses:
C. C. LOGAN,
B. F. GRAY, Jr.

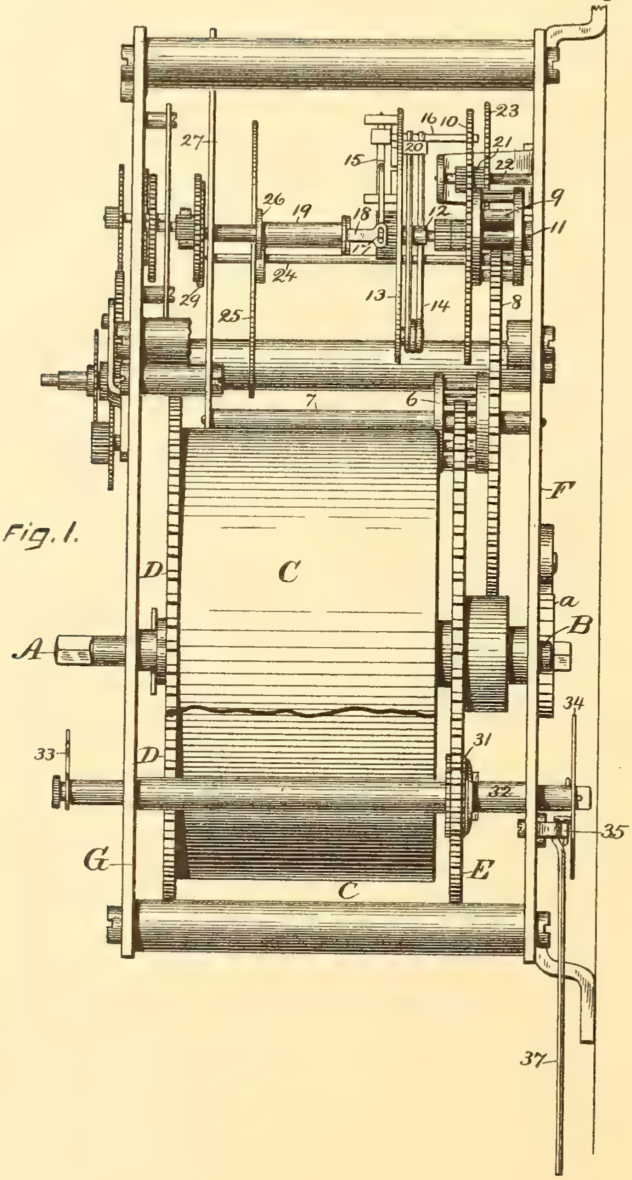
(No Model.) 3 Sheets—Sheet 1.

A. M. LANE.

CALENDAR CLOCK.

No. 473,424. Patented Apr. 19, 1892.

Fig. 1.



Witnesses.

John Edwards Jr.

Hilmer Svenson

Inventor.

Almeron M. Lane

By James Shepard

Atty.

(No Model.) 3 Sheets—Sheet 2.

A. M. LANE.

CALENDAR CLOCK.

No. 473,424. Patented Apr. 19, 1892.

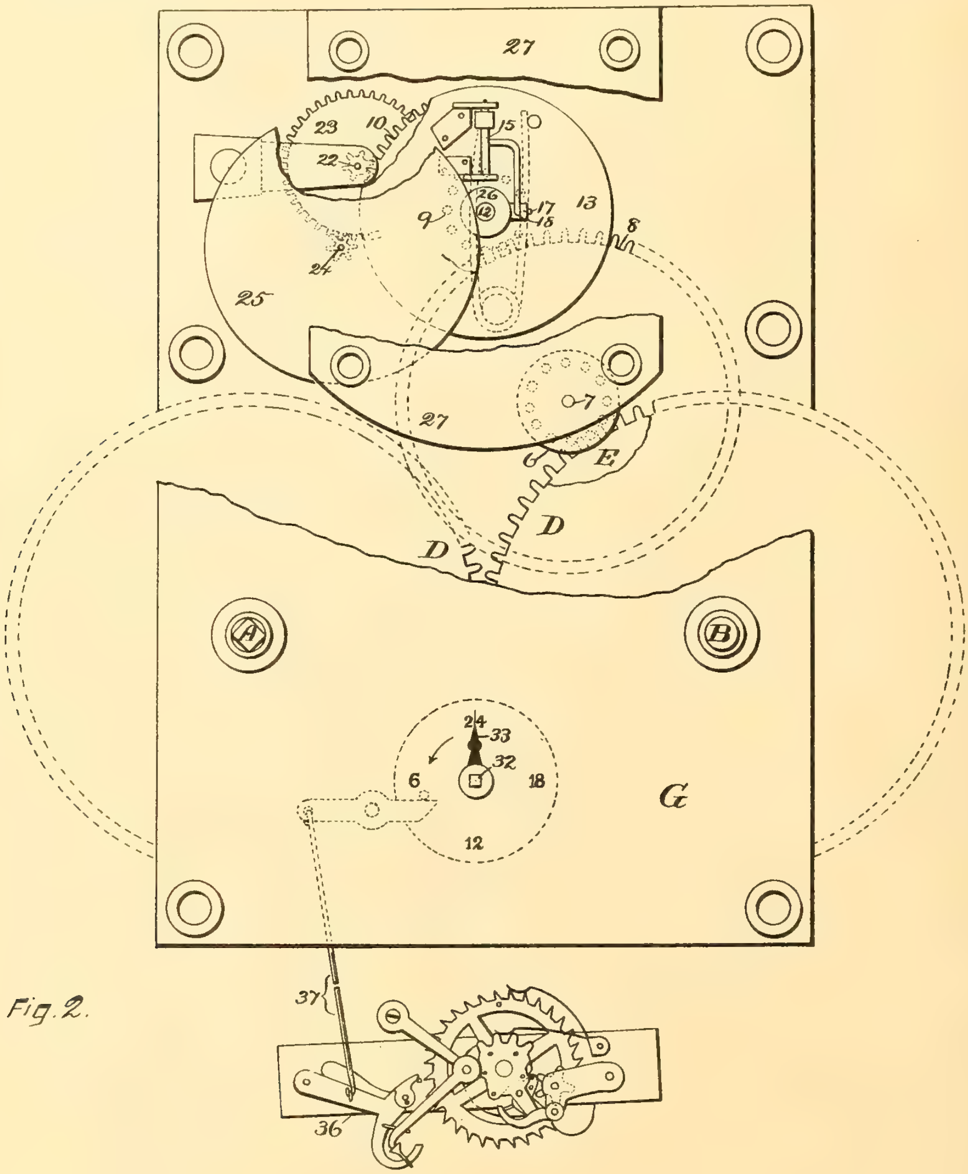


Fig. 2.

Witnesses.
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Hilmer Swenson

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Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

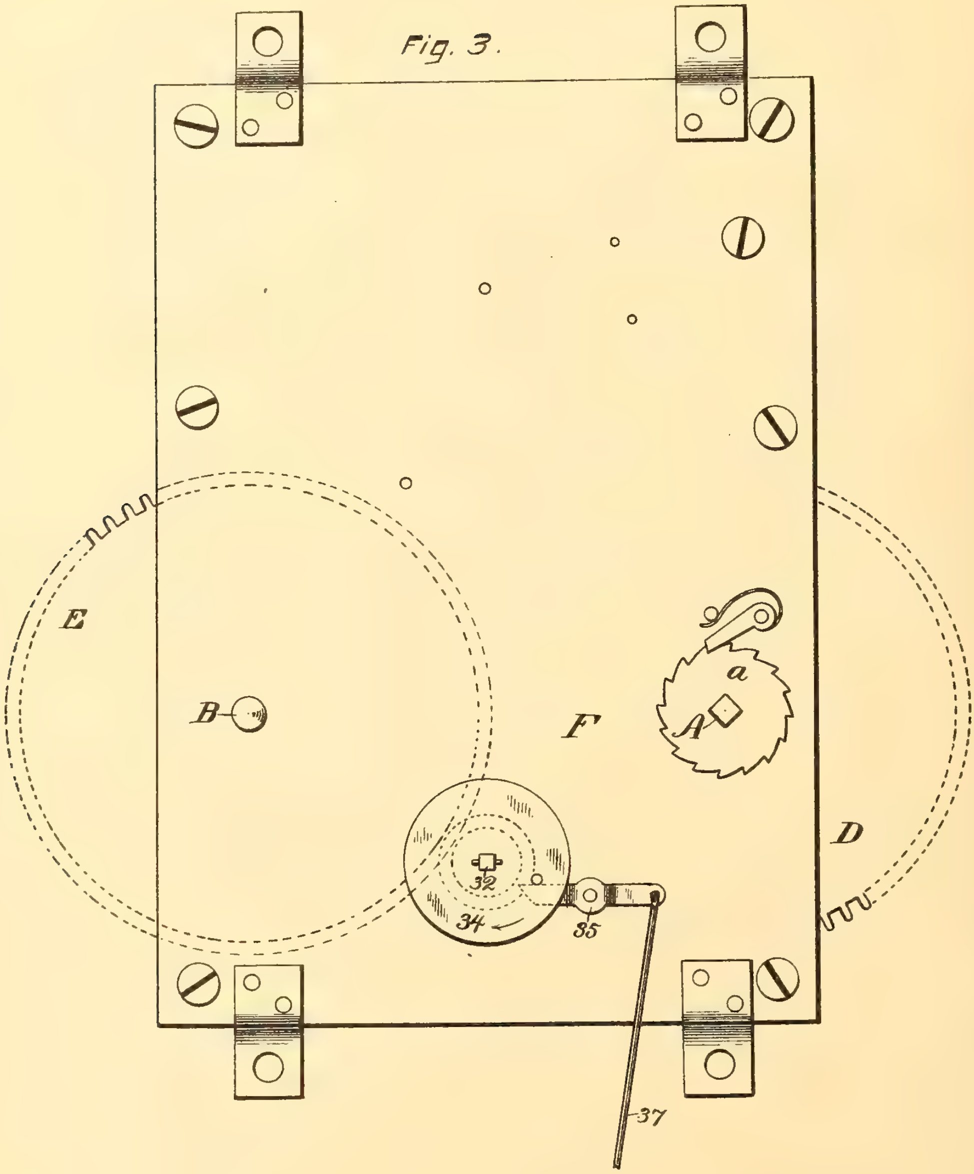
(No Model.) 3 Sheets—Sheet 3.

A. M. LANE.

CALENDAR CLOCK.

No. 473,424. Patented Apr. 19, 1892.

Fig. 3.



Witnesses.
John Edwards Jr.
Hilmer Svenson

Inventor.
Almeron M. Lane
By James Shepard
Atty.

UNITED STATES PATENT OFFICE.

ALMERON M. LANE, OF MERIDEN, CONNECTICUT.

CALENDAR-CLOCK.

SPECIFICATION forming part of Letters Patent No. 473,424, dated April 19, 1892.

Application filed July 15, 1891. Serial No. 399,660. (No model.)

To all whom it may concern:

Be it known that I, ALMERON M. LANE, a citizen of the United States, residing at Meriden, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Calendar-Clocks, of which the following is a specification.

My invention relates to improvements in calendar-clocks; and the chief object of my improvement is to prevent the calendar mechanism from having any effect on the power imparted to the escapement, whereby I may make a calendar-clock to run a long time—as, for instance, a year-clock.

In the accompanying drawings, Figure 1 is a side elevation of the main portion of my clock-movement and parts for operating the calendar. Fig. 2 is a front view of the motor-train of the equalizing-movement, together with a calendar mechanism; and Fig. 3 is a rear elevation of my clock-movement and parts for driving the calendar mechanism.

I drive the escapement of my clock by an equalizing motor-train and connect the calendar mechanism so that it is driven by the principal spring of said motor-train, whereby it is separated and in a sense cut off from the escapement and pointer by the lesser spring in said equalizing-motor.

I have herein illustrated my calendar as applied to the four-hundred-day clock shown and described in my application, Serial No. 335,276, filed December 28, 1890; but it may, if desired, be applied to an eight-day or any other clock having an equalizing motor-train. I prefer to employ the equalizing-train that is shown and described in Letters Patent No. 328,724, dated October 20, 1885, to David Shive; but other trains of this class may be substituted therefor. I have also illustrated the calendar mechanism shown and described in the patent of William A. Terry, No. 99,258, dated January 25, 1870; but other calendar mechanism may be substituted therefor.

A B designates the main shaft, having a spring-barrel C rigidly secured to and moving with the engaging-wheels D D. The springs within the spring-barrels (not shown) are connected by one end to said barrels and by the other end to the respective shafts A D, the winding-shaft A being provided with the ordinary ratchet *a*. This arrangement of the springs and wheels is not of my invention. The force of the spring in both barrels is exerted upon the shaft B for driving what I may term the "main wheel" E. Instead of putting one wide spring in each spring-barrel, I prefer to employ double or triple springs in each barrel, so as to secure greater length without any increase of strength, the connection of such springs within a spring-barrel being a matter of common knowledge, and therefore requires no description.

The main wheel E engages a lantern-pinion 6 on the shaft 7, which shaft carries the wheel 8, that drives the pinion 9 of the wheel 10, which revolves on a stationary shaft or stud 11. In axial alignment with said stud 11 is a revolving shaft 12, carrying upon it a plate or disk 13, upon which disk is mounted the equalizing-spring 14 (indicated by broken lines in Fig. 2) and bell-crank lever 15. One arm 16 of said lever projects rearwardly into an opening in the wheel 10, while its other arm 17 enters an opening in the arm 18 of the sliding sleeve 19 on the shaft 12. One arm of the spring 14 bears against a stud 20 on the disk 13 and the other arm bears against the arm 16 of the angle-lever 15. The wheel 10 engages a pinion 21 on the shaft 22, and thereby drives the wheel 23, that engages a pinion on the shaft 24, and thereby drives the friction-disk 25, that is mounted on said shaft, all substantially as shown and described in said Shive patent.

The operation of the parts is to equalize the force of the mainsprings and from time to time wind up the lesser spring 14, so that the latter alone exerts its force in propelling the shaft 12. Whenever the power of the springs exerted upon the main wheel E is greater upon the wheel 10 than that required for driving the shaft 12, said wheel 10 moves faster than the disk 13 and operates the angle-lever to impinge the flange 26 of the sleeve 19 upon the friction-disk 25, thereby either stopping the movement of said friction disk and wheel 10 or holding them in check while they move slowly, thereby exerting just power enough to keep the lesser spring properly wound, the surplus force being lost by friction, all substantially as shown and described in said Shive patent.

In front of the supplemental movement-

plate 27 on the shaft 12 is a wheel 29, that drives the escapement-train and dial-wheels, said train being in a separate frame 30, like that of an ordinary watch-movement, less the spring, excepting that the shaft of the main wheel is made long enough to project for connection with the wheel 29. I consider it unnecessary to describe in detail the dial-wheels and escapement, because they are fully described in my aforesaid application and because they may be changed at pleasure without departing from the spirit of my invention so long as they are driven only by the lesser spring of the equalizing-motor.

By the side of the main wheel E is a pinion 31, frictionally mounted on the shaft 32 in any ordinary manner—as, for instance, by a spring-washer—so that said pinion will drive said shaft and attached parts, while at the same time the shaft may be turned within said pinion by the application of the requisite force. The lower portion of one of the wheels D and one spring-barrel C is broken away in Fig. 1, in order to show this shaft 32. The pinion 31 in this figure is partly hidden from view by the main wheel E. This pinion is also indicated bybroken lines in Fig. 3. At the front end of said shaft and in front of the front plate G, I secure to said shaft a suitable index 33 and small twenty-four-hour dial, said pinion and main wheel being so related to each other and the clock that said pinion and shaft will revolve once every twenty-four hours. The twenty-four dial, with whole or part of the figures indicating the twenty-four hours of a day, may be on the lower part of the main dial or on the front movement-plate and a hole left in the main dial or other provision be made for inspecting said twenty-four-hour dial when desired.

At the rear of the rear movement-plate F, I rigidly secure to the shaft 32 a pin-disk or cam 34 for acting upon a lever 35 for actuating the calendar mechanism 36 through the connecting-rod 37, as in ordinary calendar-clocks, so far as the construction of cam, lever, connecting-rod, and calendar mechanism are concerned when considered by themselves.

Heretofore in calendar-clocks the cam or pin-disk for operating the calendar mechanism has been geared from the center shaft, so that turning the pointers to set the clock will also turn said cam or pin-disk. This enabled the position of the cam to be determined by turning the pointers so that the calendar could be set to change at midnight. The power for operating the calendar mechanism also necessarily affected more or less the power imparted to the escapement.

In my clock there is no connected gearing that unites the calendar-operating disk or cam and the pointers, and hence setting the pointers does not set said disk or cam. The power imparted to the escapement is always the same whether the power on that part of the train which is driven by the principal spring or springs be greater or less, and consequently the power necessary to operate the calendar mechanism in no way affects the power imparted to the escapement.

In order to set my calendar so that it will change at midnight, it is only necessary to set the clock-pointers in the ordinary way and then turn the shaft 32 and its cam to bring the index 33 to the proper hour on the twenty-four-hour dial relatively to the time of setting the clock and midnight. For example, if the calendar be set at nine o'cock in the morning the index 33 will be set on the figure "9." If set at nine o'clock in the evening, then the index will be set at "21." Of course the pin-disk or cam 34 is so attached to the shaft that the lever 35 is let off when the index 33 stands at "24."

I claim as my invention—

1. A calendar-clock consisting of an equalizing-movement having principal and lesser springs, a calendar mechanism, and calendar-operating devices connected with the principal motive part of said movement and disconnected from that part thereof which is driven directly by the lesser spring, substantially as described, and for the purpose specified.

2. The combination of an equalizing-movement, a calendar mechanism, calendar-operating devices connected with the principal motive part of said equalizing-movement and disconnected from the time-pointers, and a device for setting said calendar-operating devices, substantially as described, and for the purpose specified.

ALMERON M. LANE.

Witnesses:
JAMES SHEPARD,
HILMER SVENSON.

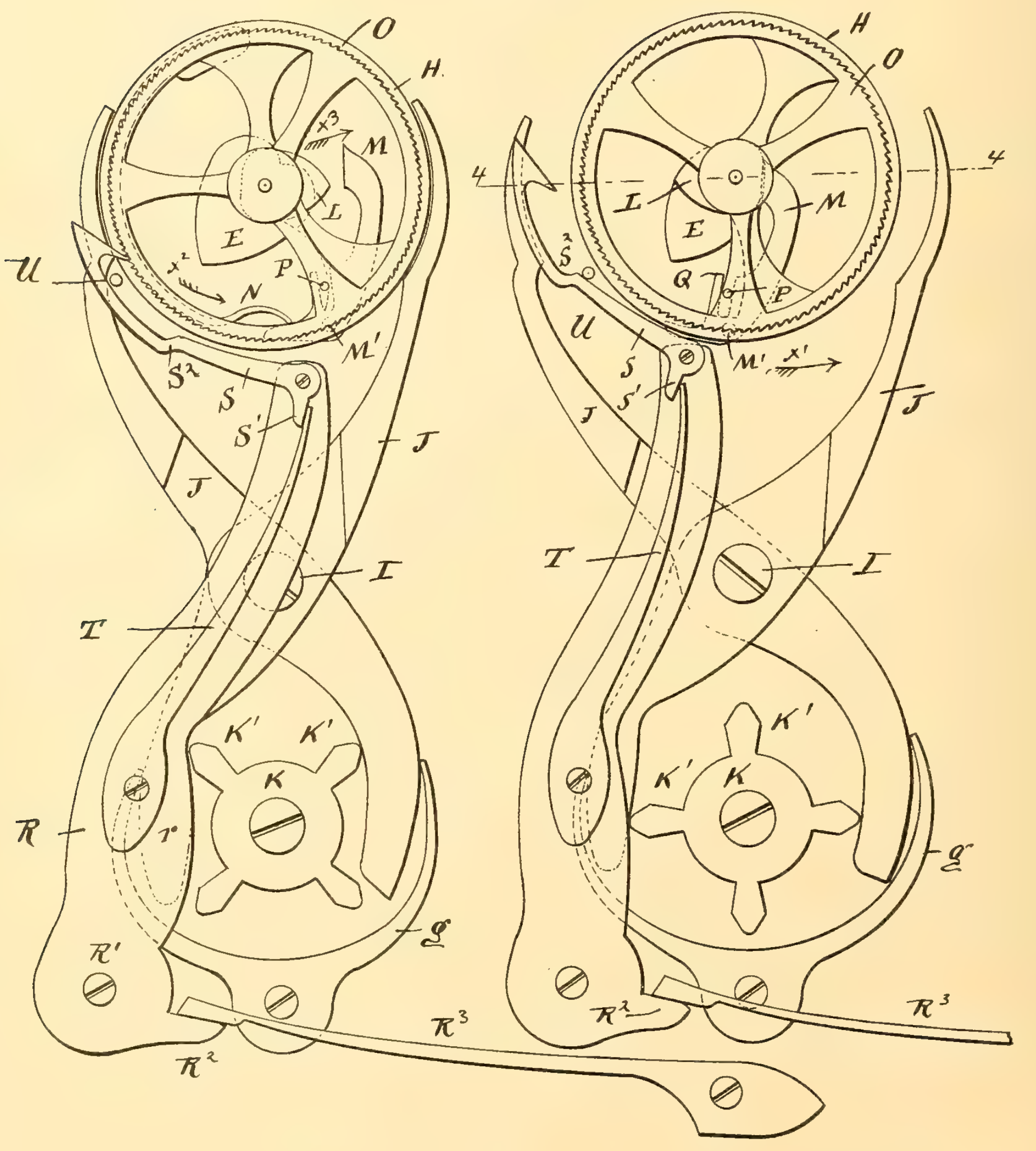
(No Model.) 2 Sheets—Sheet 1.

A. REYMOND.

STOP WATCH.

No. 474,100. Patented May 3, 1892.

Fig: 1. Fig: 2.



WITNESSES:

Charles Schroeder

Charles Bles

INVENTOR

A. Reymond

BY

Goepel & Raegener

ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

A. REYMOND.

STOP WATCH.

No. 474,100. Patented May 3, 1892.

Fig: 3.

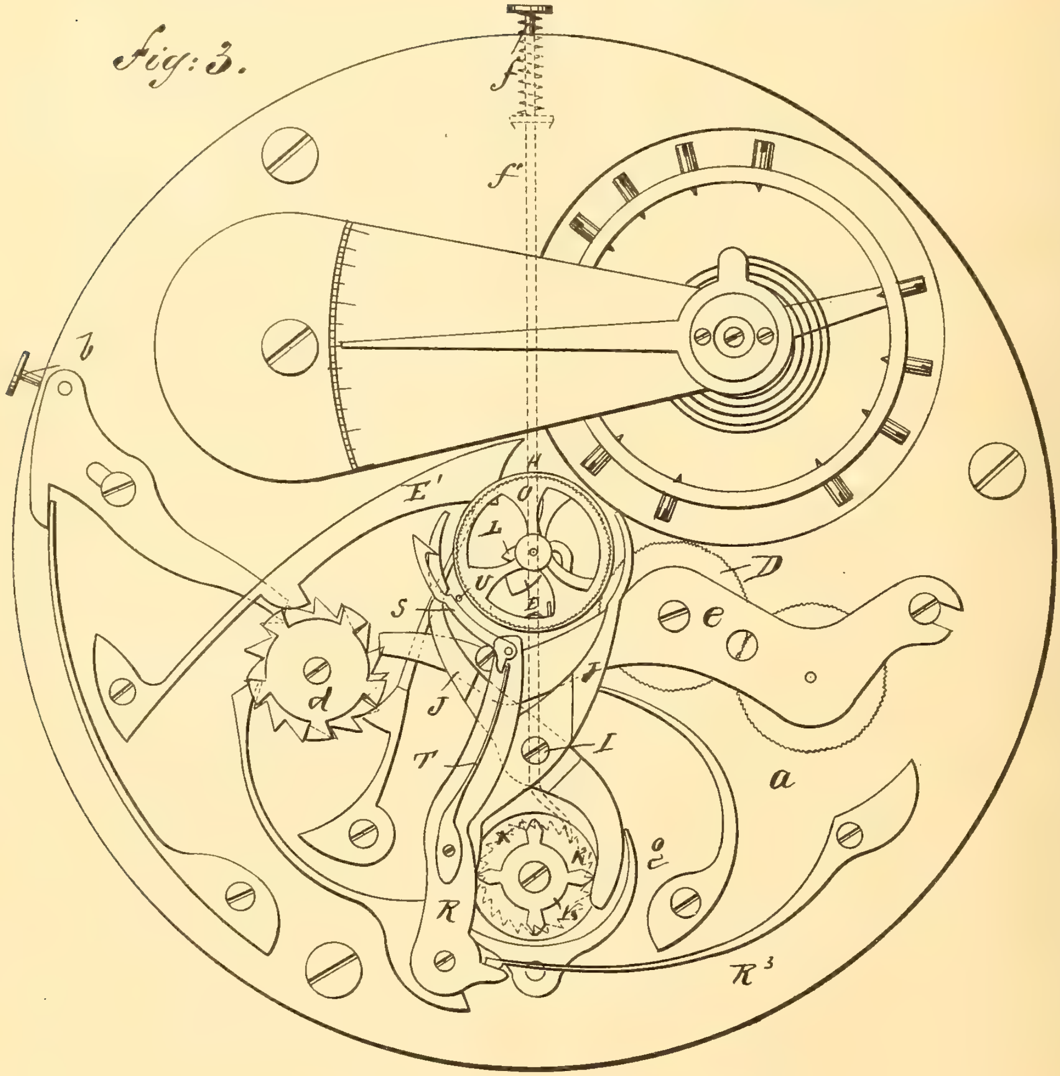
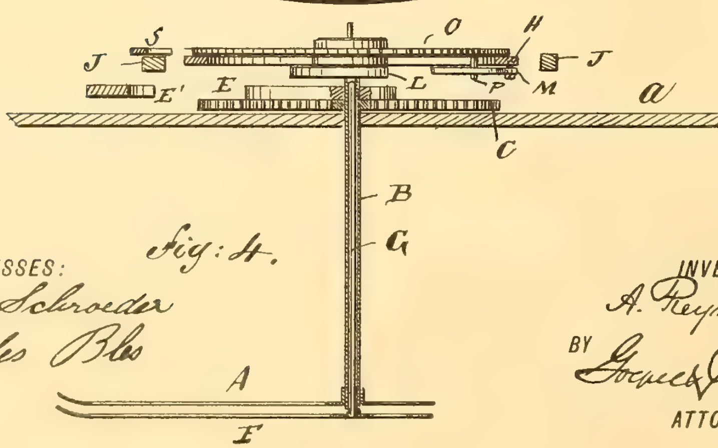


Fig: 4.



WITNESSES:

Charles Schroeder

Charles Blos

INVENTOR

A. Reymond

BY *Goepel & Raegener*

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ADRIEN REYMOND, OF NEW YORK, N. Y.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 474,100, dated May 3, 1892.

Application filed October 19, 1891. Serial No. 409,159. (No model.)

To all whom it may concern:

Be it known that I, ADRIEN REYMOND, a citizen of Switzerland, and a resident of the city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Stop-Watches, of which the following is a specification.

This invention relates to improvements in stop-watches, and especially to that class of stop-watches known as "split-seconds stop-watches," and which are provided with two fly-back hands, which can be stopped independently. In watches of this kind the split-seconds hand is operated by a heart-cam, which is mounted on the arbor carrying the seconds-hand, and against which heart-cam a spring-pressed lever acts that is pivoted on the brake-wheel fixed on the arbor of the split-seconds hand. When the split-seconds hand is to be stopped, brake-jaws are operated, which embrace said brake-wheel, and thus hold the same. The arbor of the seconds-hand, however, continues to rotate, as does also the heart-cam on the same, and the result is that considerable friction is produced between the edge of the heart-cam and the lever resting against the edge of the same.

The object of my invention is to provide a watch of this kind, which is so constructed that as soon as the wheel on the arbor of the split-seconds hand is locked said lever is removed from the edge of the heart-cam and does not bear on the same during the rotations of said heart-cam, so that the watch-movement is relieved of a considerable amount of unnecessary work and operates much more accurately.

The invention consists in the combination, with the usual split-seconds mechanism, brake-wheel, and brake-levers, of an additional lever provided with a hook-pawl for engaging a tooth-wheel mounted loosely on the arbor of the split-seconds hand above the brake-wheel and provided with a pin adapted to act upon the heart-cam lever and to throw the same away from the edge of the heart-cam when the brake-levers are applied.

The invention also consists in the construction and combination of parts and details, as will be fully described hereinafter, and finally pointed out in the claims.

In the accompanying drawings, Figures 1 and 2 are enlarged detail plan views of the brake-levers, the brake-wheel, the heart-cams, the toothed wheel above the brake-wheel, and the pawl for opening said toothed wheel. Fig. 3 is a plan view of the back plate of the watch-movement, showing my improvement. Fig. 4 is a transverse sectional view on the line 4 4 of Fig. 2, parts being omitted.

Similar letters of reference indicate corresponding parts in all the figures.

The usual fly-back or seconds hand A is mounted on the tubular arbor B, carrying the toothed wheel C, adapted to be engaged with the stop-wheel D of the movement, said tubular arbor B also carrying the usual heart-cam E, on which the heart-cam lever E′ can act. The split-seconds hand F is mounted on the arbor G, passing longitudinally through the tubular arbor B, and carrying at or near its upper end the fixed brake-wheel H, that can be embraced and acted upon by two brake-levers J, pivoted to the plate *a* at I, and actuated by the cam-wheel K, having four cam-teeth K′, in the usual manner. The tubular arbor B carries a fixed heart-cam L directly below the brake-wheel H, and to the said brake-wheel the heart-cam lever M is pivoted at M′, Figs. 1 and 2, on one end of which heart-cam lever M the spring N acts, that is secured to the under side of the brake-wheel H, said spring serving to press the end of the heart-cam lever M against the edge of the heart-cam L. Above the wheel H the wheel O, of slightly less diameter than the wheel H, is mounted loosely upon the arbor G, the rim of said wheel O being provided with ratchet-teeth. A pin P projects from one arm of the wheel O downward and into the notched prong or arm Q of the heart-cam lever M, so that when the wheel O is shifted in relation to the wheel H said pin P, acting on the edges of the notch of said prong or arm Q, shifts the heart-cam lever M. A lever R is pivoted at R′ to the plate *a* of movement and is provided with a spur R^2, on which the spring R^3 bears, said lever R having a cam-edge *r*, on which the cam-teeth K′ of the wheel K can act while acting on the brake-lever J. To the end of the longer arm of the lever R a hook-pawl S is pivoted and is provided with a spur S′, against which a spring T bears, that is fast-

ened on the lever R, said spring T serving to keep the hook end of the pawl S in engagement with the teeth on the rim of the wheel O. Said hook-pawl is provided at about one-half its length with a bend or shoulder S^2, as shown, and between said hook-pawl and the edge of the tooth-wheel O a fixed pin U projects upward from the plate *a*.

b is a push-pin for operating the combined ratchet and cam wheel *d*, which in turn operates the heart-cam lever E′ and the slide *e*, carrying the chronograph-wheels, in the usual manner.

f is a push-button for operating the push-rod *f*′, the inner end of which acts on a ratchet-wheel connected with the wheel K.

g is a spring bearing against the brake-lever J.

To operate the stop-watch mechanism, the push-button *b* is pushed inward, whereby the stop-wheel D is brought in engagement with the wheel C, and the heart-cam-lever E′ is moved from the large heart-cam E on the tubular arbor B. By means of the wheel D the tooth-wheel C, the tubular arbor B, and the heart-cams E and L are rotated. As the heart-cam lever M is pressed against the edge of the small heart-cam L by its spring N, said lever M and the brake-wheel H, to which it is attached, are compelled to participate in the rotary movements of said tubular arbor B. As the split-seconds arbor G is fixed to the brake-wheel H, it is also compelled to participate in the rotary movement, and thus the two hands A and F are moved together. The parts are now in the relative positions shown in Fig. 2. The brake-levers J do not rest against the brake-wheel H and the hook-pawl S rests against the pin U in the usual manner shown, and its hooked end is disengaged from the teeth of the tooth-wheel O. If the hand F is to be stopped, the push-button *f* is pushed inward, whereby the cam-wheel K is forced to make a quarter-turn, permitting the spring *g* to press the ends of the brake-levers J against the rim of the brake-wheel H, and at the same time permitting the spring R^3 to throw the end of the lever R in the direction of the arrow X′, Fig. 2, whereby the hook-pawl S is moved in the corresponding direction, and as the shoulder S^2 passes the pin U the spring T on the lever R throws the hook end of the pawl S in engagement with the tooth-rim of the wheel O, and said hook-pawl turns the wheel O in the direction of the arrow X^2, Fig. 1. The pin P of said wheel O, acting on the edges of the notch in the prong or arm Q, throws the cam-lever M in the direction of the arrow X^3—that is, away from the edge of the heart-cam L on the tubular arbor B, and thus permitting said arbor and the heart-cam L to rotate without bearing against the lever M, which is held clear of the same, as shown in Fig. 1. The watch-movement is thus relieved of the labor of overcoming the friction between the edges of the moving heart-cam L and the heart-cam lever M, as was necessary in the split-seconds watches made heretofore. When the hand A has been stopped by pushing the push-button B, the push-button *f* is again pressed inward, whereby another quarter-turn is given to the cam-wheel K, causing the teeth K′ of the same to throw the levers J from the edges of the brake-wheel H and into the position shown in Fig. 2, and at the same time the lever R is moved in an inverse direction of the arrow X′, and the pawl S is moved by the action of the pin U on the same into the position shown in Fig. 2, and the tooth-wheel O is released, permitting the spring N to throw the end of the heart-cam lever M against the edge of the heart-cam L, whereby the brake-wheel H, to which said lever M is pivoted, and the arbor G, to which said brake-wheel is attached, are turned so as to bring the two handles A and F in line again.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a stop-watch, the combination, with a tubular seconds-hand arbor and a split-seconds-hand arbor in said tubular arbor, of a heart-cam fixed on the tubular arbor, a brake-wheel fixed on the split-seconds-hand arbor, a heart-cam lever pivoted on said brake-wheel, brake-levers for gripping the brake-wheel, and mechanism for moving the heart-cam lever pivoted on the brake-wheel from the heart-cam fixed on the tubular arbor when the brake-levers are applied, substantially as set forth.

2. In a stop-watch, the combination, with a tubular seconds-hand arbor and a split-seconds-hand arbor passed through the same, of a heart-cam on the tubular arbor, a brake-wheel fixed on the split-seconds-hand arbor, a heart-cam lever pivoted to the brake-wheel, a tooth-wheel mounted loosely on the split-seconds-hand arbor and engaging the heart-cam lever, and a hook-pawl for operating said tooth-wheel, substantially as set forth.

3. In a stop-watch, the combination, with a tubular seconds-hand arbor and a split-seconds-hand arbor passed through the same, of a heart-cam on the tubular arbor, a brake-wheel fixed on the split-seconds-hand arbor, brake-lever for holding said brake-wheel, a heart-cam lever pivoted on the brake-wheel, a tooth-wheel mounted loosely on the split-seconds-hand arbor and engaging the heart-cam lever, a lever pivoted on one of the brake-levers, a hook-pawl on said lever, and means for operating the brake-levers and the lever pivoted on one of said brake-levers, substantially as set forth.

4. In a stop-watch, the combination, with a tubular seconds-hand arbor and a split-seconds-hand arbor passed through the same, of a heart-cam on the tubular arbor, a brake-wheel fixed on the split-seconds-hand arbor, brake-levers for holding said brake-wheel, a heart-cam lever pivoted to the brake-wheel, a pin on the brake-wheel engaging said heart-

cam lever, a tooth-wheel mounted loosely on the split-seconds-hand arbor, a lever pivoted on one of the brake-levers, a hook-pawl pivoted to said lever and provided with a bend or shoulder, and a fixed pin between said hook-pawl and the rim of the tooth-wheel, substantially as set forth.

5. In a stop-watch, the combination, with a tubular seconds-hand arbor and split-seconds-hand arbor passed through the same, a heart-cam on the tubular arbor, a wheel fixed on the split-seconds-hand arbor, a heart-cam lever pivoted on said wheel, and means for bringing said lever out of contact with said heart-cam on the tubular arbor, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

ADRIEN REYMOND.

Witnesses:
OSCAR F. GUNZ,
CHARLES SCHROEDER.

(No Model.)

F. PEQUEGNAT.

CHRONOMETER ESCAPEMENT.

No. 474,301. Patented May 3, 1892.

Fig. 1

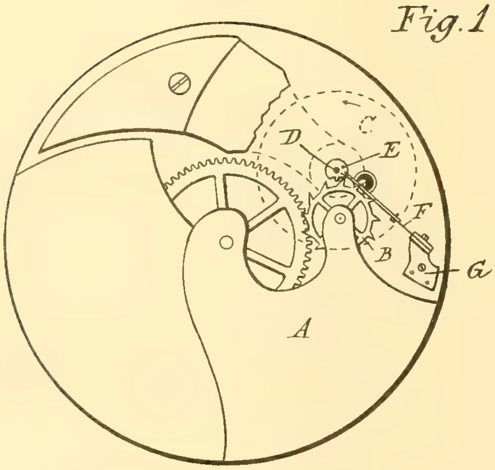


Fig. 2

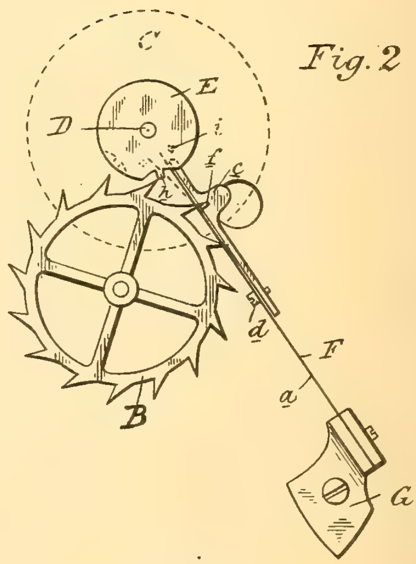


Fig. 3

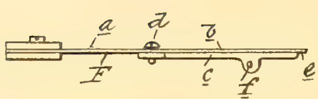


Fig. 4

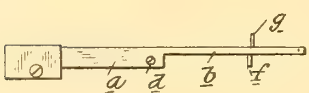


Fig. 5

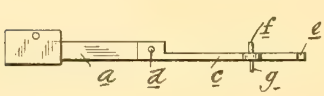
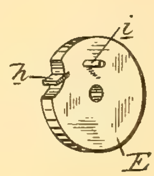


Fig. 6



Witnesses.
J. Paul Mayer
M. B. O'Dogherty

Inventor:
Frank Pequegnat
by Thos. S. Sprague & Son,
Att'ys.

UNITED STATES PATENT OFFICE.

FRANK PEQUEGNAT, OF ST. LOUIS, MICHIGAN.

CHRONOMETER-ESCAPEMENT.

SPECIFICATION forming part of Letters Patent No. 474,301, dated May 3, 1892.

Application filed May 27, 1891. Serial No. 394,316. (No model.)

To all whom it may concern:

Be it known that I, FRANK PEQUEGNAT, a citizen of the United States, residing at St. Louis, in the county of Gratiot and State of Michigan, have invented certain new and useful Improvements in Chronometer-Escapements, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in chronometer-escapements and to the peculiar construction of the detent-lever, whereby its manufacture is simplified and cheapened and its efficiency increased, and, further, in the peculiar construction, arrangement, and combination of the various parts, all as more fully hereinafter described.

In the drawings, Figure 1 is an elevation of a chronometer-escapement embodying my invention. Fig. 2 is a similar view enlarged, showing the parts in a different position. Fig. 3 is a side elevation of the detent-lever enlarged. Figs. 4 and 5 are top and bottom plans of the lever. Fig. 6 is a detached perspective view of the table-roller.

A is the frame. B is the escape-wheel; C, the balance-wheel; D, the arbor of the balance-wheel, and E the table-roller secured to the arbor of the balance-wheel, these parts being of known and usual construction, except as more fully hereinafter described.

F is the detent-lever, which consists of a single spring secured in the bracket G. This spring consists of a wide blade *a*, extending a portion of its length, (I have shown it as exceeding about half the length of the detent-lever,) and the reduced portion *b*, extending from the wide or base portion to the end.

c is a reinforcing-plate secured at the outer end of the base portion of the spring by a screw or pin *d* and extending beside the reduced portion of the spring to near the end thereof, leaving only the projecting lip *e*. This plate also carries the detent-pallet *f* and a stop-pin *g*, adapted to strike any suitable stop on the watch-frame, and I preferably provide any suitable means for adjusting this stop.

The table-roller is provided with the impact-jewel *h* in its circumference and the pin *i* upon the lower face.

The parts being thus constructed their operation is as follows: The oscillation of the balance-wheel carries with it the table-roller. In moving in the direction shown by the arrow (the detent-pallet being in engagement with a tooth of the escape-wheel) the pin *i* first strikes the detent-lever and disengages the pallet. The escape-wheel starts to revolve and a tooth strikes the impact-jewel *h*, giving the impulse to the table-roller to wind the balance-spring and carrying the pin *i* past the lever, which at once springs back into the path of the escape-wheel and engages with a tooth thereon. This movement of the pin causes the lever to bend in the portion *a*, as the reinforcing-plate *c* prevents the reduced portion from being bent. The escape-wheel is now held, while the balance-wheel returns, the pin *i* passing the lever by striking the lip *e* and bending the reduced portion of the spring only, as shown in dotted lines in Fig. 2. This reduced portion is free to move in this direction, as it is secured to the plate *c* only by the screw *d*. The balance-spring then returns the table-roller to the position shown in dotted lines in Fig. 2, and the operation is repeated.

By making the detent-lever a single spring having a main and reduced portion with the reinforcing-plate I can produce it very cheaply as compared with levers heretofore produced, consisting of two springs of different tensions secured to a rigid lever.

What I claim as my invention is—

In a chronometer-escapement, a detent-lever consisting of a single-piece spring secured at one end to a suitable bracket and having its opposite end reduced from a point at or about the center of the lever and a rigid reinforcing-plate secured to the lever below the reduced portion and extending parallel therewith to a point slightly below the end of the lever, whereby the lever is formed with two independent bending-points, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK PEQUEGNAT.

Witnesses:
GIDEON S. CASE,
T. BAMBOROUGH.

(No Model.) 2 Sheets—Sheet 1.

J. A. GUINN.

RAILWAY TIME SIGNAL.

No. 475,108. Patented May 17, 1892.

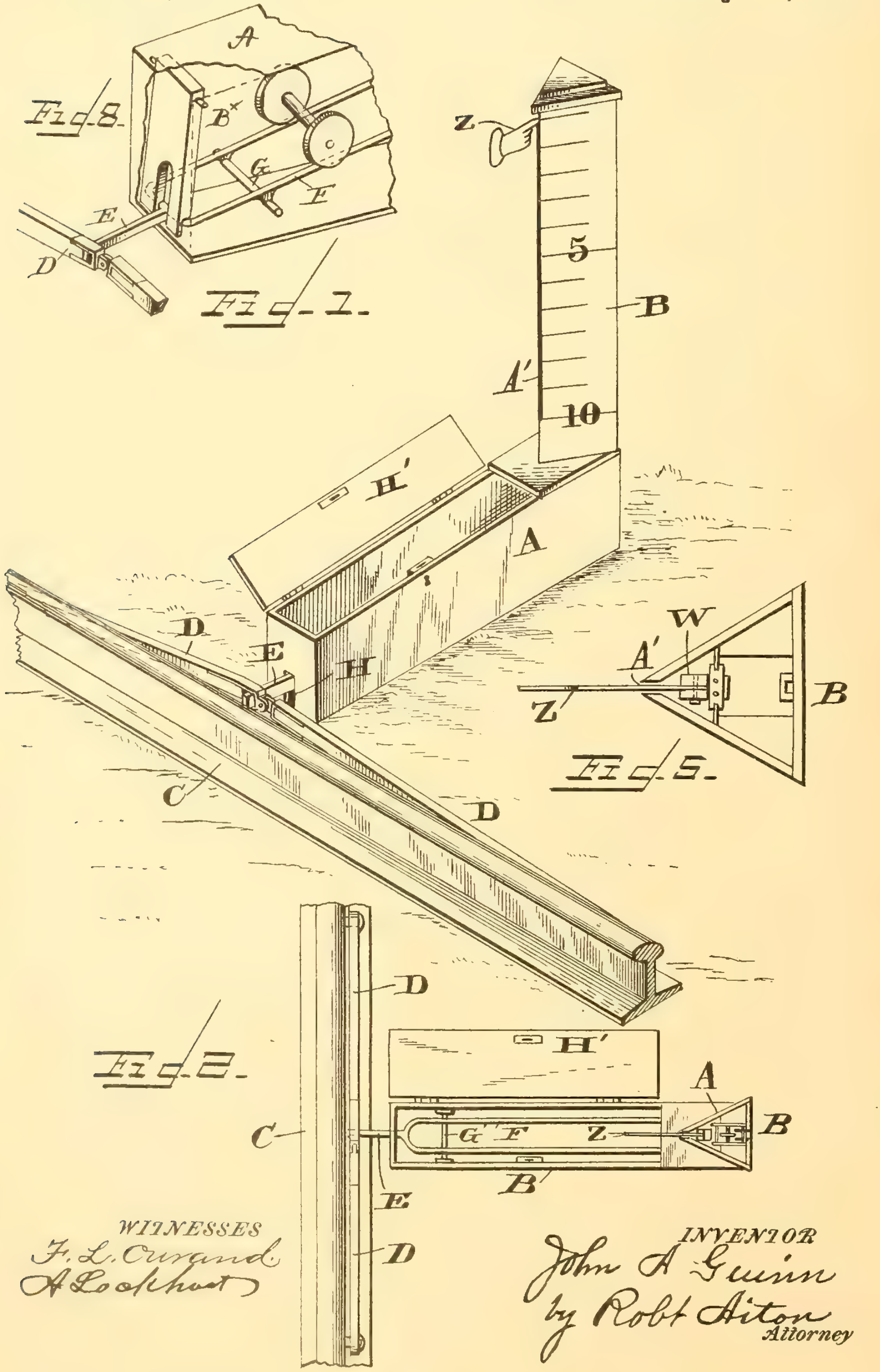


Fig. 8.

Fig. 7.

Fig. 5.

Fig. 2.

WITNESSES
F. L. Ourand
A Lockhart

INVENTOR
John A Guinn
by Robt Aiton
Attorney

(No Model.) 2 Sheets—Sheet 2.

J. A. GUINN.

RAILWAY TIME SIGNAL.

No. 475,108. Patented May 17, 1892.

Fig. 6.

Fig. 3.

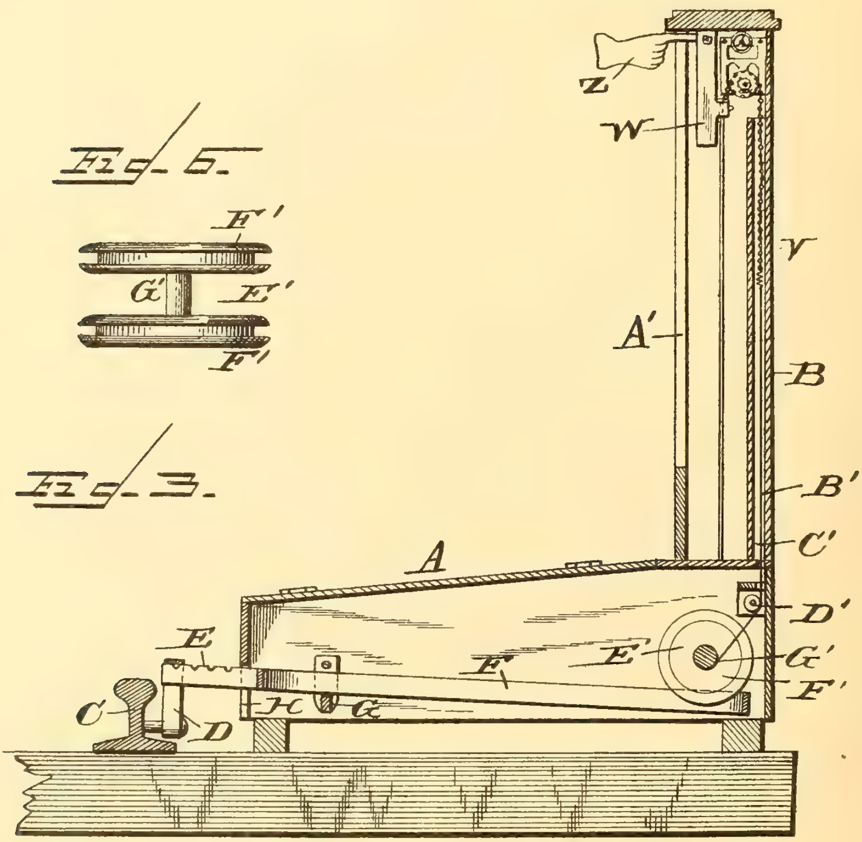
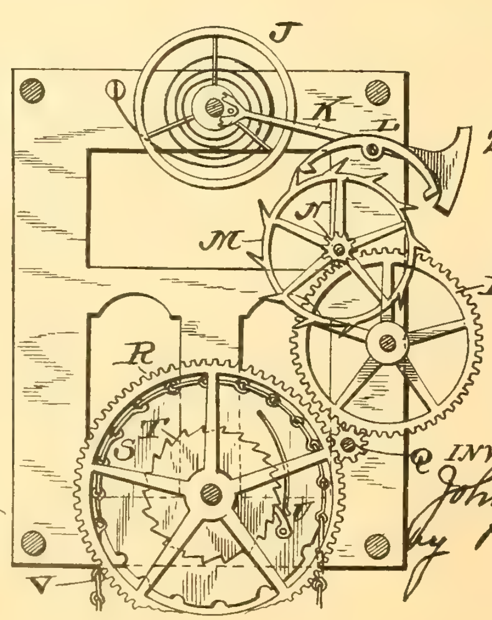


Fig. 4.



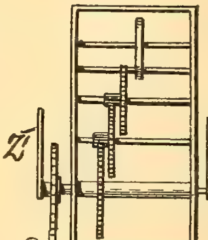


Fig. 7.

WITNESSES
F. L. Ourand
A. Lockhart

INVENTOR
John A. Guinn
by Robt. Aiton
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN ALEXANDER GUINN, OF PERRY, IOWA.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 475,108, dated May 17, 1892.

Application filed January 21, 1892. Serial No. 418,818. (No model.)

To all whom it may concern:

Be it known that I, JOHN ALEXANDER GUINN, a citizen of the United States, residing at Perry, in the county of Dallas and State of Iowa, have invented certain new and useful Improvements in Railroad Time and Danger Signals; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in railroad time-signals, more especially to that class of time-signal designed to indicate to the engineer of a train the length of time that has elapsed since the preceding train passed the signal, whereby a safe distance can be maintained between the trains, and thereby prevent or lessen the danger of a collision or running into the advance train by the rear one.

For this purpose my invention consists of a train of time-gearing, which is operated by a weight carrying an index, and mechanism operated by the contact of a wheel of the railroad-train for resetting said index to its initial point.

It further consists of an operating-blade, a tilting track with roller thereon, and a time mechanism with an index and having its operating-weight, to which said index is attached, raised by the movement of the said roller on said track in the direction of the operating-blade.

It further consists of the combination and arrangement of parts hereinafter described.

In the drawings, Figure 1 represents a perspective view of a time-signal embodying my invention. Fig. 2 represents a plan view of the same, the lid of the standard being removed. Fig. 3 represents a central longitudinal section in elevation of the device. Fig. 4 represents a side view, on an enlarged scale, of the time mechanism of the device. Fig. 5 represents a plan view of the standard with the index, the time mechanism being removed. Fig. 6 represents a top view of the roller employed in resetting the index. Fig. 7 represents a modification of a portion of the device, and Fig. 8 represents a swinging trigger for locking the tilting track of the device.

Similar letters indicate corresponding parts in the different figures.

Referring to the drawings, A designates a box of rectangular shape, and B a hollow standard of preferably triangular shape on one end of the said box.

C designates a railroad-rail, and D blades of metal or other suitable material pivoted at one of their ends to the said rail and having their adjacent ends pivotally connected together and secured to the outer end of the arm E of a track F. The said track F is located within the box A, resting on the cross-bar G, which is secured to the sides of the said box, and its arm E projecting through a vertical slot or opening H in the end wall of the box.

In the upper portion of the standard B is located the time mechanism shown in Fig. 4, said mechanism consisting of the balance-wheel J, the lever K, the pallet L, the escapement-wheel M, having on its shaft the pinion N, the gear-wheel P, meshing with the said pinion, the pinion Q, meshing with the said gear-wheel P, the gear-wheel R, meshing with said pinion, and the sprocket-wheels S, and the ratchet-wheel T on the shaft of the said gear-wheel R. The ratchet T is connected with its shaft T′, so as to rotate therewith, but the sprochet-wheel is loosely mounted on the said shaft and carries a spring-pressed pawl U, which engages the teeth of said ratchet-wheel, thereby permitting the free movement of the sprocket-wheel on the shaft in one direction and its movement with the shaft in the opposite direction.

To one end of the sprocket-chain V on the wheel S is secured a weighted block W, having a projection X, which is fitted in a vertical groove Y in the standard, so that said block is guided in its rising and falling movements. Connected with the block W and projecting from the standard B is the index Z, which is adapted to move in a vertical slot A in said standard, the side walls of the slot having on their outer faces marks or indices to designate minutes or other portions of time. To the other end of the sprocket-chain V is secured a cord B′, which is located in a vertical recess C′ in the standard B and, passing downward into the box A and around a pulley D′

in the said box, is attached to a roller E′, movable on the track F. The said roller is composed of two grooved wheels F′, which run on the rails of the said track F and are connected by a bar G′, to which the cord B′ is connected.

It will be understood that as a wheel of a train traveling in either direction comes in contact with a blade D it depresses the same, thereby lowering the arm E of the track F, thus raising the other end of the track F, or that on which the roller E′ normally rests. This movement causes the said roller to run down the track toward the arm E, unwinding the cord wound on the bar G′; but as the circumference of said bar is much less than the distance traveled over by the periphery of the roller the cord B′ is drawn down, and with it the sprocket-chain V, thereby turning the sprocket-wheel S on its shaft and raising the block W, with the index, to the top of the standard or its initial point, where it is held as long as the car-wheel remains on the blade D. When the wheel of the car passes over and off the blade D, so that it bears no longer on the arm E, the rear end of the track F, owing to its weight being greater than the arm end, is lowered, and the roller E runs down the track or away from the arm E, so that it does not draw on the cord and sprocket-chain V, thus permitting the block W, which has been raised, as previously described, to operate the clock or time mechanism. As the block W descends the sprocket-chain V is drawn over the wheel S, drawing up the cord B′, so as to remove the slack in the same, and the index Z points out the time by the coinciding marks or figures on the sides of the standard, which is constructed of sufficient height to indicate a sufficient time. In the drawings it is marked for ten minutes, but, as will be readily understood, may be of such height that a greater number of minutes or longer time may be indicated, if so desired. In place of a marked vertical standard and a vertically-moving index a rotating pointer and a circular dial, as shown in Fig. 7, may be employed.

To the lid of the box A is secured a lid G′, whereby the box may be kept closed and the removal of the roller therefrom prevented.

Within the box A is secured a swinging trigger B$^{\times}$, adapted to engage the tilting track and lock the same until the wheel or roller E runs down and unlocks the same by its weight striking against and pushing it from the notch or opening H.

Having thus described my invention, what I desire to claim and secure by Letters Patent is—

1. A railroad time-signal consisting of an operating-blade, a pivoted track connected with said blade, a time mechanism having an operating-weight connected with a roller on said track, said parts being combined substantially as described.

2. A railroad time-signal having an operating-blade adapted to be pivoted to a railroad-rail, a tilting track having one end connected with said blade, a time mechanism with an index attached to the operating-weight thereof, a standard in which said time mechanism is supported, and a weight on said tilting track having means, substantially as described, connected with it and the operating-weight for raising the latter, said parts being combined substantially as described.

3. A railroad time-signal having an operating-blade, a tilting track, a train of time mechanism provided with an operating-weight, sprocket-wheel loosely mounted on a shaft in said train and connected with a ratchet-wheel on the same shaft by a spring-pawl carried by the said sprocket-wheel, a sprocket-chain on said sprocket-wheel connected with said operating-weight, and a cord connecting said sprocket-chain and roller, said parts being combined substantially as described.

4. A railroad time-signal having a time mechanism with an index, an operating-blade, a tilting track, a weight on said track, and means, substantially as described, connected with said weight and said time mechanism for resetting said index to its initial point without affecting the time mechanism, said parts being combined substantially as described.

5. A railroad time-signal consisting of an operating-blade adapted to be pivoted to a railroad-track, a tilting track connected with said blade, a standard, a time mechanism in the upper part of said standard, having a ratchet-wheel keyed on one of its shafts, and sprocket-wheel loosely mounted on the same shaft and carrying a pawl engaged with said ratchet-wheel, an index projecting from said standard and connected with the operating-weight of the time mechanism, a roller on said tilting track, and a sprocket-chain on the sprocket-wheel, connected at one end with the operating-weight and at the other by a cord with the said roller, said standard having time-gradations on its faces, and said parts being combined substantially as described.

6. A railroad time-signal having a track with a roller thereon for tilting the same and a swinging trigger for locking said track, said parts being combined substantially as described.

7. A railway time and danger signal having a clock mechanism, a tilting-lever, a roller having a cross-bar of reduced diameter, a weight for operating said clock mechanism having an index connected therewith, and a cord and chain for raising said weight, said cord being secured to said roller and said roller operating on said tilting-lever, said parts being combined substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN ALEXANDER GUINN.

Witnesses:
H. A. HOYT,
H. B. LEE.

(No Model.)

W. G. SPIEGEL.

TIME LOCK FOR SAVINGS BANKS.

No. 474,870. Patented May 17, 1892.

Fig. 1.

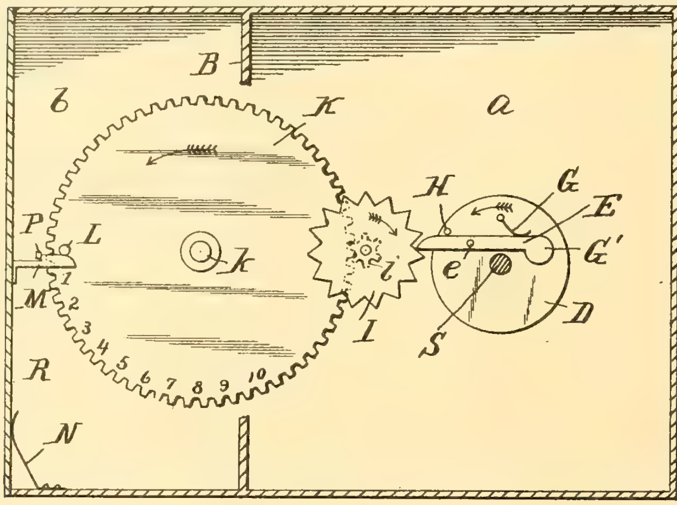
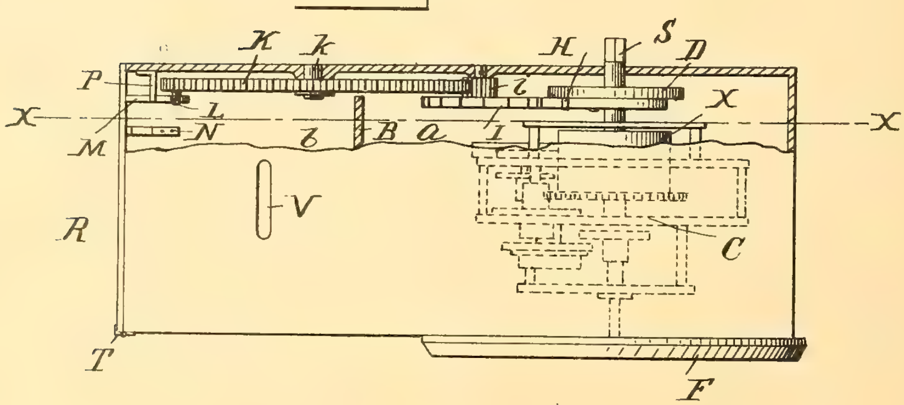


Fig. 2.



Witnesses

W. H. Courtland

Richard H. Mitchell

Inventor

William G. Spiegel

by A. P. Smith

his Atty.

THE NORRIS PETERS CO., PHOTO-LITHO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM G. SPIEGEL, OF NEW YORK, N. Y., ASSIGNOR TO LEROY W. BALDWIN, OF SAME PLACE.

TIME-LOCK FOR SAVINGS-BANKS.

SPECIFICATION forming part of Letters Patent No. 474,870, dated May 17, 1892.

Application filed June 16, 1891. Serial No. 396,429. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. SPIEGEL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Toy Savings-Banks, (Case No. 2;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of mechanism by which a receptacle for coin or other things may be locked and remain locked until the expiration of a certain time before it can be opened.

In the drawings, Figure 1 is a vertical section on line x x of Fig. 2, showing a portion of a clock-case with the coin-receptacle and opening mechanism. Fig. 2 is a plan view of the same, a part of casing being broken away.

It is evident that if a toy savings-bank could be made with a lock which could be set to open at a certain date it would be useful in enabling children to save up their money for a certain day, as Christmas or the Fourth of July. The great cost of the ordinary form of time-lock has heretofore prevented anything of the kind being applied to a toy bank, however, and the combination of such a bank with an ordinary clock has been out of the question, because the work of releasing the lock by any cheap mechanism would be sufficient to destroy the accuracy of the clock-movement, and consequently detract from its value as a time-keeper. To avoid these difficulties and disadvantages, I have hit upon the idea of employing the power exerted to wind up the clock to operate the lock instead of calling upon the power of the clock-spring to do this work. The clock-train merely stands guard over the lock and will not permit it to be opened until it (the clock-movement) has run down and been wound up a certain number of times, during which a certain number of hours or days must have elapsed. After the clock has run down a certain number of times, determined by setting the intermediate mechanism, a further attempt to wind it up will release the lock and permit the door to open.

The above is my preferred principle of operation, though it would be possible to combine an ordinary toy savings-bank having a slot through which coins may be introduced and a door through which the accumulated coins may be removed, with a clock and a train of mechanism so arranged that the power stored up in the clock-spring should open the lock at a predetermined time by simply reversing the action of the pawl-and-ratchet connection herein shown and described.

Referring to the mechanism shown in the drawings, A is a clock-case, which is divided by the partition B into a chamber a, in which the usual train of clock mechanism is contained, and a second chamber b, which serves as a receptacle for moneys of various kinds. This partition is cut away at one end, as shown in Fig. 2, to permit the passage of the dial-wheel K.

In the clock-case proper is the clock-train C, which operates the hands before the clock-face, over which the glass F is placed in the manner common and well understood.

S is the shaft to which one end of the clock mainspring X is attached, from which shaft the clock-train is driven and by which the spring is wound up. On this mainspring-shaft is the flange or disk D, upon which is mounted the pawl E by the pivot e. This pawl is normally held against the stop H by the weighted end G′ or by the light spring G. The pawl E engages with the teeth of the star-wheel I, when the shaft S is turned in the direction indicated by the arrow, turning the star-wheel one tooth for every revolution of the shaft in the direction of the arrow, but slipping by when turned in the opposite direction. On the same shaft as the star-wheel I and rigid therewith is the pinion i, which meshes with the teeth in the circumference of the dial-wheel K. On this wheel is mounted the pin or stop L, and the numbers 1 2 3 4, &c., are marked one for every two teeth on the circumference. The door R, opening into the chamber b, has hinges T, and a spring-catch M, which snaps over a peg or projection P and locks the door when it is closed. When the catch M is forced down, as by pressure of the stop L, the lock is released and the spring N forces the door open.

V is a slot, through which money may be deposited in the receptacle *b*. The dial K revolves stiffly on the arbor *k*.

The method of operating my invention is as follows: The bank being open, the dial K is turned around until the figure indicating the number of days for which it is to be set comes opposite the peg P, the shaft S having first been turned, so that the pawl E will not interfere with the revolution of the star-wheel. The door then being closed locks itself and cannot be unlocked from the outside. Suppose the bank is set for ten days. Then every night when the clock is wound up the shaft S is given five revolutions, as is customary in cheap clocks, and the star-wheel I is turned one tooth at each revolution of the disk D, or five in all. This gives the pinion *i* a third of a revolution and causes it to pass two teeth of the dial-wheel K. After the clock has run twenty-four hours and been wound up again ten times, during which time ten days must have elapsed, a further winding up of the clock will force the pin or stop L against the catch M and release the lock, so that the door will fly open and the contents of the bank may be removed.

Either the dial K or the star-wheel I are so mounted that while moved by pressure of the hand they will stay still where placed and not turn from external causes, such as simply moving the clock about. It is evident that the motion might be transmitted from any member of the clock-train other than the mainspring-shaft without departing from the spirit of my invention in its broadest scope, and that any other adjustable train of mechanism and any other lock might be used, that the coin-receptacle might be placed at the back or top, instead of the side of the clock, &c.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination of a clock having its face exposed to view so as to tell time, a coin-receptacle in the clock-case, a door for said receptacle, a lock on said door, and mechanism whereby motion may be transmitted at the expiration of a predetermined period from a member of the clock-train to the lock, and the catch thereby automatically disengaged, substantially as described.

2. The combination of a closed receptacle, a door for said receptacle, a lock on said door, a clock-train, and an adjustable train of mechanism conveying motion from the shaft of the mainspring to the lock, whereby after the mainspring has run down a certain number of times or fraction of a time a further winding up of the spring will release the lock, substantially as described.

3. The combination of a coin-receptacle, a door for said receptacle, a lock on said door, an adjustable dial-plate inclosed in the same casing with said receptacle, a projection on said dial-plate which operates the lock, a clock-train, and gearing conveying motion directly from the main spring-shaft of said clock-train to said dial, substantially as described.

4. The combination of a coin-receptacle, a door for said receptacle, a lock on said door, an adjustable dial-plate inclosed in the same casing with said receptacle, a projection on said dial-plate which operates the lock, a clock-train, and gearing conveying motion from the mainspring-shaft of said clock-train to said dial, two members of said gearing having a pawl-and-ratchet connection, whereby the dial is moved when the main shaft is turned backward to wind up the clock, but not when the shaft is turned forward to drive the clock-train, substantially as described.

5. The combination of a closed receptacle, a door for said receptacle, a lock on said door, a clock-train, and an adjustable train of gearing conveying motion from the mainspring-shaft of said clock-train to said lock, two members of said train of gearing having a pawl-and-ratchet connection, whereby the gearing is moved when the mainspring-shaft is turned backward to wind up the clock, but not when the shaft is turned forward to drive the clock-train so that after the mainspring has run down a certain number of times a further winding up of the spring will release the lock, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM G. SPIEGEL.

Witnesses:

WARREN W. FOSTER,
A. P. SMITH.

(No Model.) 2 Sheets—Sheet 1.

W. G. SPIEGEL.

TIME LOCK.

No. 474,871. Patented May 17, 1892.

Fig. 1.

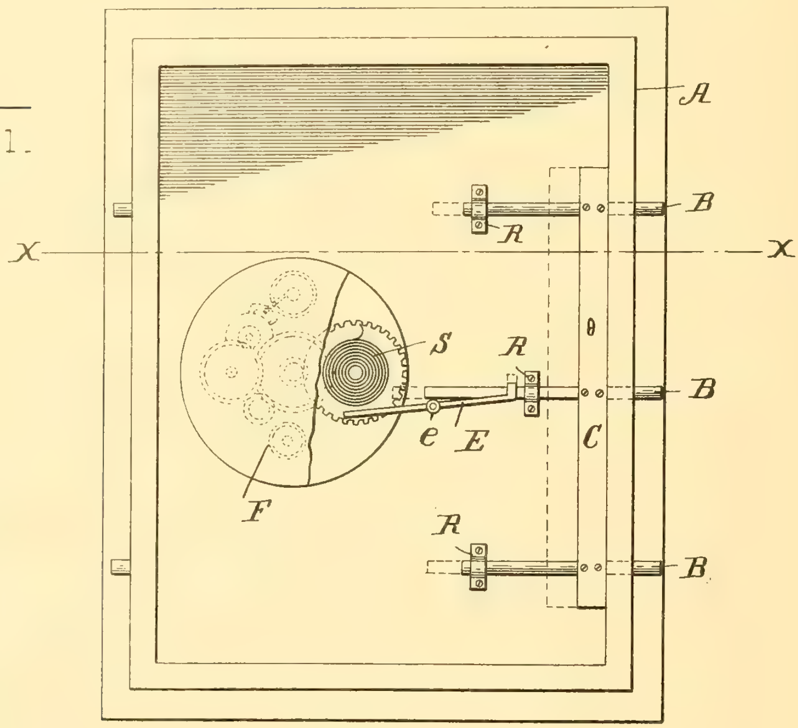
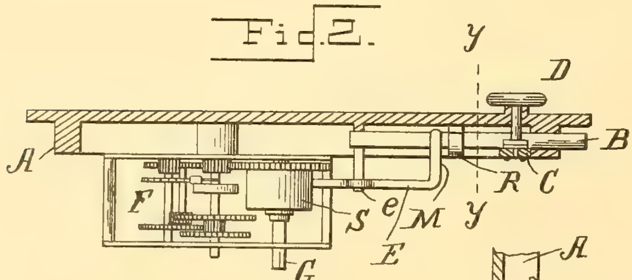


Fig. 2.



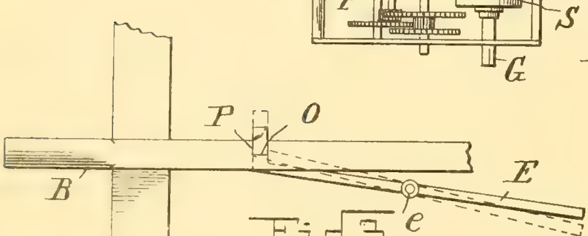


Fig. 3.

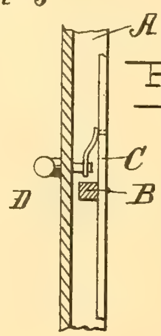


Fig. 4.

Witnesses
W. H. Courtland
J. Finley

Inventor
William G. Spiegel
by A. P. Smith
his Atty.

(No Model.) 2 Sheets—Sheet 2.

W. G. SPIEGEL.

TIME LOCK.

No. 474,871. Patented May 17, 1892.

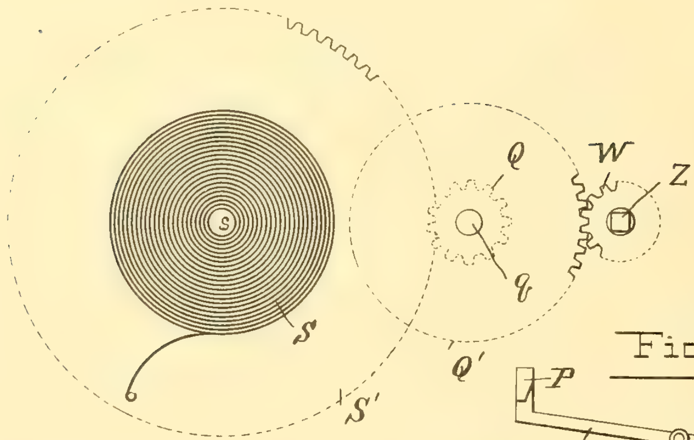
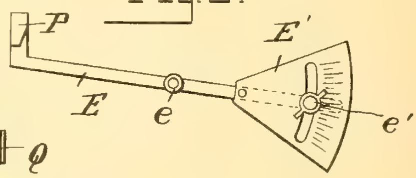


Fig. 5.

Fig. 8.



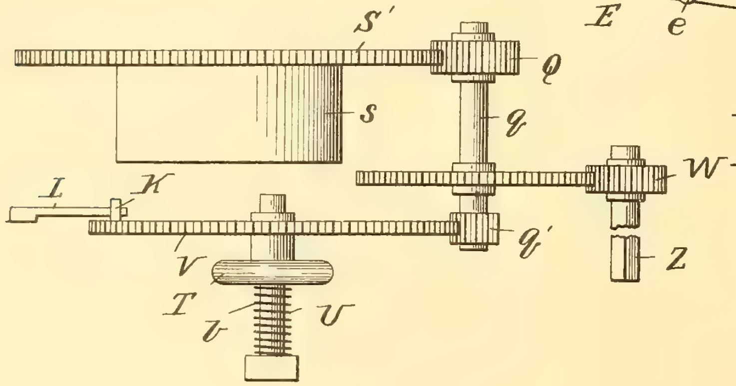


Fig. 6.

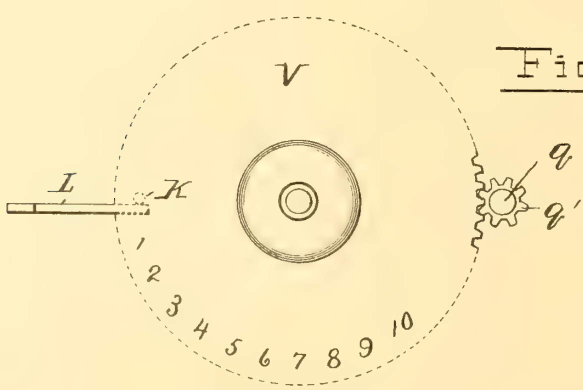


Fig. 7.

Witnesses
W. H. Courtland
J. Finley

Inventor
William G. Spiegel
by A. P. Smith
his Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM G. SPIEGEL, OF NEW YORK, N. Y., ASSIGNOR TO LEROY W. BALDWIN, OF SAME PLACE.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 474,871, dated May 17, 1892.

Application filed June 16, 1891. Serial No. 396,430. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM G. SPIEGEL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Time-Locks, (Case No. 3;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of mechanism by which a clock-train controls the detents on a system of locks and bolts, so that the lock cannot be opened until a predetermined period of time has elapsed.

In the drawings, Figure 1 represents the inner side of a safe-door with the time-lock mechanism in place, a portion of the casing about the clock-train being broken away. Fig. 2 is a horizontal section on line x x of Fig. 1. Fig. 3 is a detail of the detent mechanism. Fig. 4 is a section on line y y of Fig. 2. Figs. 5, 6, and 7 are views of the setting mechanism. Fig. 8 is a modification.

The employment of clock-trains in connection with locks and bolts, whereby a time-lock is formed, has been in vogue for many years on large bank-vaults and in all cases where the importance of the valuables to be secured warrants the expenditure of the large amount of money demanded for such time-locks, as heretofore made. A clock-train which can be gotten into a small space and that will keep accurate time is necessarily a delicate piece of mechanism and unable to do any mechanical work, such as the lifting of detents or otherwise positively actuating a bolt-releasing mechanism. If able to do this work when first put into operation, it soon wears so as to become uncertain and untrustworthy in its action. To avoid these difficulties and to construct a time-lock which shall be at once cheap in construction and certain in operation, it is necessary to relieve the clock-train of all work except that of keeping time and to take the power for operating the detent direct from the spring or weight which drives the clock-work instead of transmitting said power through the clock-train, thereby wearing it out and interfering with the accuracy of its movements.

Various forms of mechanism might be employed to transmit the power from the spring. In the form illustrated in the drawings, A represents the inner side of a safe-door.

B B B are the bolts, operated in unison by the cross-piece C and the handle D in the usual manner. One (or more) of the bolts B has a notch O cut in it, into which the detent P drops when the bolts are projected into the position shown in full lines, Fig. 1. The detent P is on the overhanging portion M of the lever E. This lever E is pivoted at c and has its other end prolonged sufficiently to form a tangent to the mainspring S of the clock-train F when the said spring is sufficiently expanded by the running down of the clock-train. The result of such expansion will evidently be to force down the end of the lever and lift the detent P out of the notch O, so as to release the bolts B and enable them to be withdrawn by the handle D into the position shown in dotted lines, so that the door opens.

In the construction shown in Figs. 1 to 4 the detent is not operated until the clock-train and spring are nearly run down, so that to regulate the period for which the lock is set it is evidently necessary to regulate the extent to which the spring S is wound up. If it is a seventy-five-hour spring and is wound up tight, the lock will not open until seventy-five hours have elapsed. If it is only wound up a fifth of the way, it will open the lock in fifteen hours, and so on. A setting mechanism to enable this to be regulated is illustrated in Figs. 5, 6, and 7.

Another method of regulation which may be used in conjunction with that shown in Figs. 5 and 6 or independently may be carried out by rendering the operating mechanism adjustable, which conveys motion from the spring to the detent. Such a species of adjustment is shown in Fig. 8. The lever E has an adjustable part E′ pivoted to it and held in position by the set-screw e'. By the aid of said set-screw and the scale marked on the adjustable section it is possible to so adjust the contact of the spring with the lever that, start-

ing with said spring wound up tight, the clockwork will run a certain number of hours before striking the adjustable piece E′, and consequently operating the detent. By varying the position of the sector E′ the number of hours which must elapse before such contact and withdrawal of the detents can be varied at will.

In the winding-gear illustrated in Figs. 5 and 6, S is the mainspring, s the shaft by which it is wound up, and S′ a gear-wheel on said shaft. Q is a pinion meshing with said gear-wheel. Q′ is a second gear-wheel mounted on the same shaft q with the pinion Q. The winding-shaft Z has a pinion W, which meshes with the gear Q′. On the shaft q is a second pinion q'. The adjustable gear and dial wheel V is loosely mounted on the stud v and held in mesh with pinion q' by spring U. It may be temporarily withdrawn out of mesh at any time by sliding it along stud v by the handle or knob T. On the face of the dial-wheel are the figures "1, 2, 3," &c., and the stop K. This stop coacts with the projection L on the clock-frame.

If the gearing S′ Q q' V is so proportioned that the dial turns one figure for every portion of a revolution of the shaft s, which corresponds to an hour's movement of the clock-train, it is evident that by pulling said dial V out of mesh with the pinion q' and setting any figure opposite the projection L and then allowing the spring U to force it back into mesh again the adjustable stop will be set so that the clock-train can only be wound up for a number of hours corresponding to the said figure. The mainspring will therefore return to complete expansion, which is sufficient to raise the detent at the expiration of that period, and the safe can then be opened, but not till then.

Two or three clock-springs might be arranged to operate on one lock to further insure certainty of action in the manner well known to time-lock makers, and other forms of adjustable stop actions for the winding-gear might be devised without departing from the principle of operation herein described and illustrated.

The method of operation of my invention is clear. If the adjustment shown in Fig. 7 is used, the movable section is set at the point corresponding to the number of hours which are to elapse before the safe is to be opened. The mainspring of the clock-train is then wound up tight and the safe-door shut. Then the bolts are projected into their sockets and the detent falls. The safe is then locked until the mainspring has unwound and expanded sufficiently to touch the part E′ of the lever E and lift the detent.

When the adjustable winding mechanism is used, the dial is set for the number of hours and the mechanism wound up until the stop acts to check further winding. The safe is then shut and the clock will take the predetermined number of hours to run down. The detent will not be lifted until the clock has run down, so that the opening of the safe at the desired time can be effected; but in the meantime it is securely locked.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination of the mainspring of a clock-train, a winding apparatus connected therewith, and an adjustable stop on said winding attachment, substantially as described.

2. The combination of the mainspring of a clock-train, a train of gear-wheels for winding said mainspring, an idle gear-wheel which may be temporarily drawn from mesh with said train of gearing and adjusted at will, a stop on said gear-wheel, and a projection from the clock-frame co-acting with said stop, substantially as described.

3. The combination, with a receptacle, a door for said receptacle, and a lock on said door, of a clock-train and spiral mainspring for operating said clock-train, a detent for said lock, a lever which is connected to said detent, and an adjustable extension on said lever, which presents a contact to the mainspring which is under control of the operator, whereby the point of expansion of the spring at which the detent will be withdrawn is under control, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM G. SPIEGEL.

Witnesses:

WARREN W. FOSTER,

A. P. SMITH.

(No Model.) 2 Sheets—Sheet 1.

M. MARTIN.

WORKMAN'S TIME RECORDER.

No. 475,458. Patented May 24, 1892.

Fig. 1,

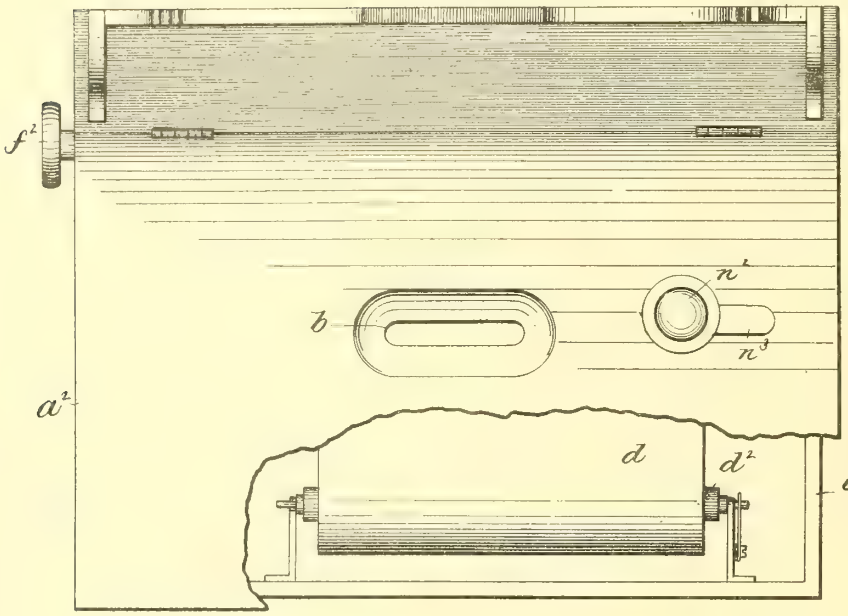
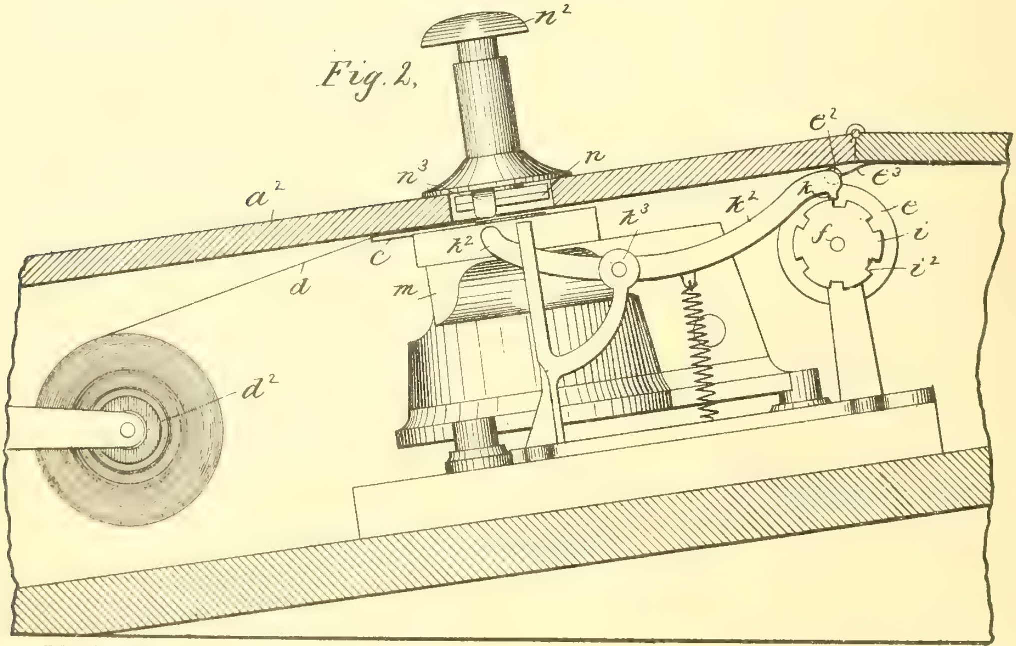


Fig. 2,



Witnesses,
Jas. J. Maloney.
M. E. Hill

Inventor,
Morris Martin,
by Jos. P. Livermore
Att'y.

(No Model.)

2 Sheets—Sheet 2.

M. MARTIN.

WORKMAN'S TIME RECORDER.

No. 475,458.

Patented May 24, 1892.

Fig. 3.

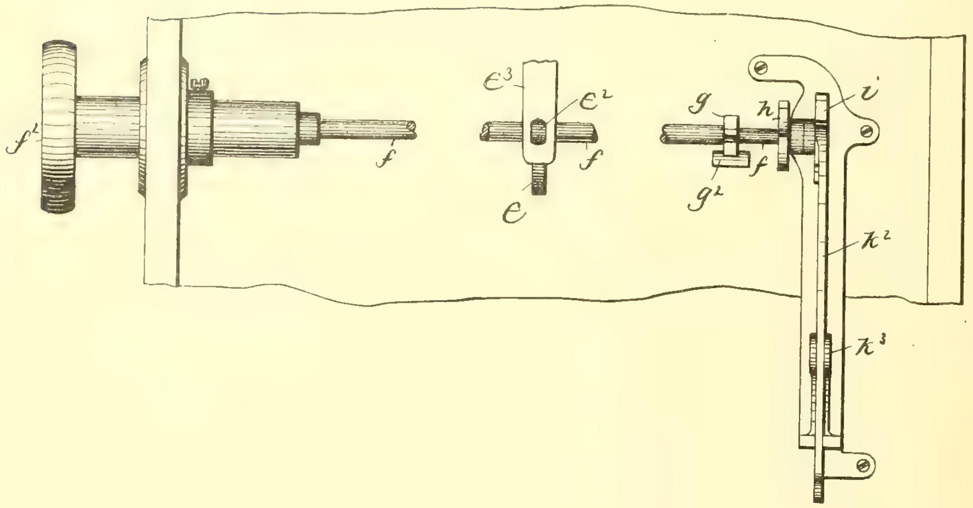


Fig. 4,

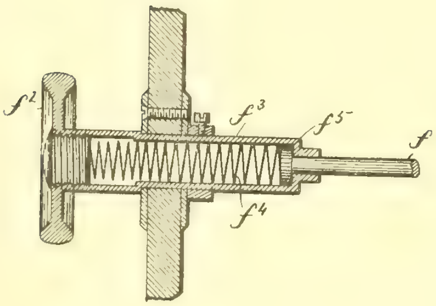
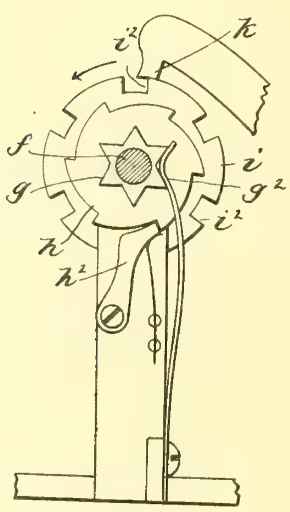


Fig. 5.



Witnesses,
Jas. J. Maloney
M. E. Hill

Inventor;
Morris Martin,
by Jos. P. Livermore
Att'y.

UNITED STATES PATENT OFFICE.

MORRIS MARTIN, OF MALDEN, MASSACHUSETTS, ASSIGNOR TO THE AUTOMATIC TIME STAMP AND REGISTER COMPANY, OF PORTLAND, MAINE.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 475,458, dated May 24, 1892.

Application filed January 15, 1889. Renewed July 20, 1891. Serial No. 400,034. (No model.)

To all whom it may concern:

Be it known that I, MORRIS MARTIN, of Malden, county of Middlesex, and State of Massachusetts, have invented an Improvement in Apparatus for Recording the Time Attendance of Employés, &c., of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an apparatus for recording the time attendance of employés or for similar purposes, and is embodied in an apparatus comprising an inclosing case containing a recording-surface, which may be a continuous strip or web of paper, on which each person whose attendance at the instrument is to be recorded signs the name, and said case also incloses a time-stamp, by which the person signing makes an imprint on the recording-surface showing the time at which the signature is written and the act of imprinting performed.

The present invention relates, mainly, to the construction of the feeding apparatus by which the recording-surface or signature-strip is moved after each signature is made and in intermediate mechanism between the paper-feeding and time-imprinting devices by which the operation of feeding is controlled by that of printing, although the actuation of the feeding mechanism is entirely independent of that of the printing mechanism and the reverse.

In a prior application, Serial No. 280,368, filed July 19, 1888, I have shown and described an apparatus comprising an inclosing case and a movable signature-strip contained therein and a time-stamp for imprinting on said strip the time at which the signature is made, and I do not in this application broadly claim these elements in an apparatus of this kind. In that apparatus the paper-feeding mechanism was actuated by the imprinting mechanism, so that the one operation of actuating the platen of the time-stamp both made the time-imprint and fed the paper into position for the next signature and imprint. I have found that such mechanism is open to certain objections and is somewhat liable to get out of order or to break down, and the object of the present invention is mainly to remove such objections.

In the apparatus forming the subject of this invention the time-stamp is of the usual construction and the web of paper is fed by being passed over a wheel or cylinder connected with a shaft having a handle outside of the case, by which it may be turned by the operator. The said handle is frictionally connected with the shaft, so that if the shaft is positively held the handle may be turned independently without injury to the parts; but when said shaft is released the turning of the handle will cause the shaft to turn and the paper to be fed. The said shaft is provided with a star-wheel or cam-plate tending to hold the shaft at definite points, the angular space between the recesses of said star-wheel corresponding to the amount of movement required for each feed of the paper. The said shaft is also provided with a locking plate or disk having recesses or shoulders also spaced to correspond with the amount required for each feeding operation, and the apparatus is provided with a lock or detent co-operating with said shoulders, and being itself operated by the plate or operating-handle of the time-stamp in such manner that when the said platen is operated to make an impression the said detent is also operated to release the shaft and permit it to be turned, so as to feed the paper the required distance, at the end of which movement the detent engages the locking-shoulder and prevents further movement of the shaft until another impression has been made. The feeding-shaft is also preferably provided with a ratchet-wheel and co-operating pawl to prevent reverse rotation of said shaft.

Figure 1 is a plan view of a time-recording apparatus embodying this invention with a portion of the inclosing case broken away; Fig. 2, a partial longitudinal section of said case, showing the inclosed mechanism in side elevation on a larger scale than represented in Fig. 1; Fig. 3, a partial plan view of the paper-feeding shaft and co-operating parts; Fig. 4, a sectional detail of the paper-feeding

shaft and its operating handle, and Fig. 5 an enlarged detail of the parts that control the rotation of the feeding-shaft as seen in side elevation from the opposite side to that represented in Fig. 2.

The inclosing case a may be in the form of a disk having an inclosed top a^2, provided with an opening b, through which the signature is written by the person the time of whose presence at the apparatus is to be recorded. The case is provided with a bed-plate c (see Fig. 2) underneath the said signature-opening to support the recording or signature strip d (shown in Fig. 2) as a web or long strip of paper supported on a reel d^2 near the front of the case, from which it is extended over the bed-plate c and over a feed wheel or cylinder e, fixed to the feed-shaft f, the said wheel e having a roughened or adhesive surface against which the strip is pressed by a roll e^2, supported at the end of a spring e^3, connected with the top of the case at the rear of the cover or hinged portion, so that it is easily accessible when the cover of the case is opened for the purpose of placing the recording-strip in operative position. The strip after it passes the feed-wheel e may fall into a suitable receptacle below the top part of the case or desk and operative parts therein.

The feed-shaft f is connected with a handle f^2 outside the case by a frictional connection, (best shown in Fig. 4,) the said handle f^2 being fixed upon a short tubular piece f^3, containing a spring f^4, that presses against a disk or enlargement f^5 at the end of the shaft f and presses the same against a shoulder at the end of the tubular portion f^3, thus making a sufficiently firm connection between the shaft f and handle f^2 to enable the said shaft to be rotated by the handle and feed the paper, except when the shaft is positively held by locking devices that will be hereinafter described. The shaft f is also provided with a cam-plate g, (see Fig. 5,) shown as star-shaped and acted upon by a spring or yielding projection g^2, which tends to hold the shaft at definite angular positions, throwing the said shaft to one of said positions, except when the said shaft is held or turned by a greater force than that of the spring acting on the cam-plate. This device tends to limit the movement of the shaft to what is sufficient for one feed movement of the recording-strip, so that if the shaft is merely turned far enough by the operator to cause the projecting part of the cam-plate to pass the co-operating spring projection the latter will throw the shaft the remainder of the distance, or nearly so. The said shaft f is also provided with a ratchet-wheel h, having teeth spaced to correspond with the amount of movement required for the feed, which teeth co-operate with a pawl h^2 to prevent the shaft from being turned in the wrong direction. The said shaft is also provided with a locking device i, shown as a disk having a number of locking projections or shoulders i^2, spaced to correspond with the feed movements of the shaft, which shoulders co-operate with and are controlled by a positive detent or locking device k, shown as a projection at the end of a lever k^2, pivoted at k^3, (see Fig. 2,) and operated by the time-stamping mechanism, which will be hereinafter described, in such manner that when the time-imprint is made the detent k is raised from engagement with the corresponding shoulder i^2, which is set with relation to the cam-plate g, as shown in Fig. 5, so that when the shoulder is released or disengaged by said detent, as just stated, the action of the cam-plate and its spring will throw the shaft and locking device forward just far enough to prevent the re-engagement of the detent k with the shoulder i, with which it was last engaged, so that the shaft is unlocked and can be turned by the handle or wheel f^2 a distance equal to the amount required for the feed of the strip. The pawl h^2 engages the ratchet h when in this position, so that the shaft cannot be turned back to engage the detent with the same shoulder as before, but must be turned forward, if at all. In such forward movement the detent k will drop into engagement with the next shoulder i, and thus positively lock the shaft until said detent is disengaged by the next operation of the printing mechanism.

The signature-strip g is wide enough to extend over the die of a time-stamp mechanism m, the outer case or frame-work only of which is shown in Fig. 2, as the said instrument may be of well-known construction, and the specific construction of said instrument forms no part of the present invention. An instrument of this character is shown in Letters Patent to Emerson, No. 224,666, dated February 17, 1880, to which reference may be had for a more detailed description of the instrument, if need be. For the understanding of the present invention it is sufficient to know that said time-stamp instrument has a printing-die operated by a clock-work or motor having a uniform rate of speed, so that the impressions made by said die vary from moment to moment and each impression is a representation or indication of the time at which it was made. The impression may be made by embossing or through the intervention of an ink-ribbon or otherwise by means of a platen n, that is operated by a handle n^2 outside the case a to press the paper against the surface of the die, so as to make the time-imprint thereon. The said platen or its handle has a part n^3 that engages the end of the detent-lever k^2, as will be understood from Fig. 2, so as to raise the detent out of engagement with the locking-disk, thus leaving the said locking-disk and paper-feeding shaft ready for the next feed movement, as before explained.

The operation of the apparatus is as follows, it being generally used to indicate the time at which each one of a number of different employés enter and leave an establishment, al-

though it may be used to indicate the time at which a person was present at and operated the instrument for any reason—as, for example, to indicate the different visits of a watchman: The operator arriving at the instrument usually finds the signature of the last preceding operator in place under the signature-opening b, and his first act is to turn the handle f^2, so as to convey the preceding signature out of the way and bring a blank portion of the paper under the opening b. This can be done, as the last operator released the shaft in the act of making the time-imprint; but if the shaft should fail to turn it shows that the last operator had neglected to make a time-imprint and the present operator would do so, such imprint being opposite to the signature of the last operator, who would by his neglect get the time of the succeeding operator instead of his own. In either case, the operator, having turned the handle f^2, would cause the shaft to rotate, and after a movement equal to about half the required movement of the feed the cam-disk g and its spring g^2 would throw the shaft the remainder of the distance; but just before the spring projection g^2 fully seated in its corresponding recess the detent projection k would engage the next shoulder i^2 of the locking-disk and prevent further rotation of the shaft, and owing to the frictional connection between the handle and shaft the operator could not by turning the handle too far bring any strain on the apparatus, and owing to the locking mechanism it would be impossible to feed the paper more than a definite amount, determined by the space between the successive locking-shoulders i^2. The operator would then sign on the paper through the opening b and then operate the handle n^2, which would make the time-imprint opposite the signature, showing the time at which the signature was made, and would also release the shaft ready for the next paper-feeding operation.

The operator might, if desired, feed the paper ahead after making the signature and time-imprint, in which case the next person, finding a blank space, would sign immediately and make an imprint, and then either feed the paper onward or leave it, as preferred. In any event the operator, if finding a signature already under the opening, would have to feed the paper, making an imprint, if necessary, owing to the neglect of the previous signer to make one, or, if finding the blank space already there, would sign and make the corresponding imprint, when the apparatus would be ready for the next operator.

By the herein-described construction the actuation of the paper-feed is wholly independent of the actuation or operation of the time-imprinting mechanism, but is controlled thereby, so that only one feed movement can be made for each time-imprint, and the operator's own signature is a guarantee that the said operator was present, as it would be impossible for any person to make the record without forging the signature, which would lead to detection.

The apparatus is simple, durable, and inexpensive and more reliable than that in which intermediate mechanism between the printing and paper-feeding apparatus is employed to effect both operations of feeding and imprinting by a single act of the operator or by the actuation of a single handle.

I claim—

1. The combination of an inclosing case provided with a signature-opening, with a recording-strip inclosed in said case and movable below said opening, a feed-shaft for the said strip, provided with a handle outside the case and a lock and detent for said shaft, and an independently-operated time-stamp inclosed in said case, the platen or part by which the impression of said time-stamp is made co-operating with the said detent to release without actuating the paper-feeding shaft when the impression is made, substantially as described.

2. The combination of an inclosing case provided with a signature-opening, with a recording-strip inclosed in said case and movable below said opening, a feed-shaft for the said strip and handle outside of the case frictionally connected with the said shaft and a lock and detent for said shaft, and an independently-operated time-stamp inclosed in said case, the platen or part by which the impression of said time-stamp is made co-operating with the said detent to release without actuating the paper-feeding shaft when the impression is made, substantially as described.

3. The combination of an inclosing case provided with a signature-opening, with a recording-strip inclosed in said case and movable below said opening, a feed-shaft for said strip, provided with a cam-plate and yielding projection co-operating therewith, and a locking-disk provided with shoulders, a detent co-operating with said shoulders, and a time-stamp the platen of which is provided with a part that engages the detent, substantially as described.

4. The combination of an inclosing case provided with a signature-opening, with a recording-strip inclosed in said case and movable below said opening, a feed-shaft for said strip, provided with a cam-plate and yielding projection co-operating therewith and also provided with a ratchet and pawl, a handle outside the case frictionally connected with said shaft, and a time-stamp having an operating-handle outside the case by which an imprint is made independently of the movement of the shaft, substantially as described.

5. The combination of an inclosing case provided with a signature-opening, with a recording-strip inclosed in said case and movable below said opening, a feed-shaft for the

said strip, provided with a handle outside the case and a time-stamp inclosed in said case, and an operating-handle for the platen of said time-stamp outside of the case and independent of the handle by which the feed-shaft is operated, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MORRIS MARTIN.

Witnesses:
JOS. P. LIVERMORE,
JAS. J. MALONEY.

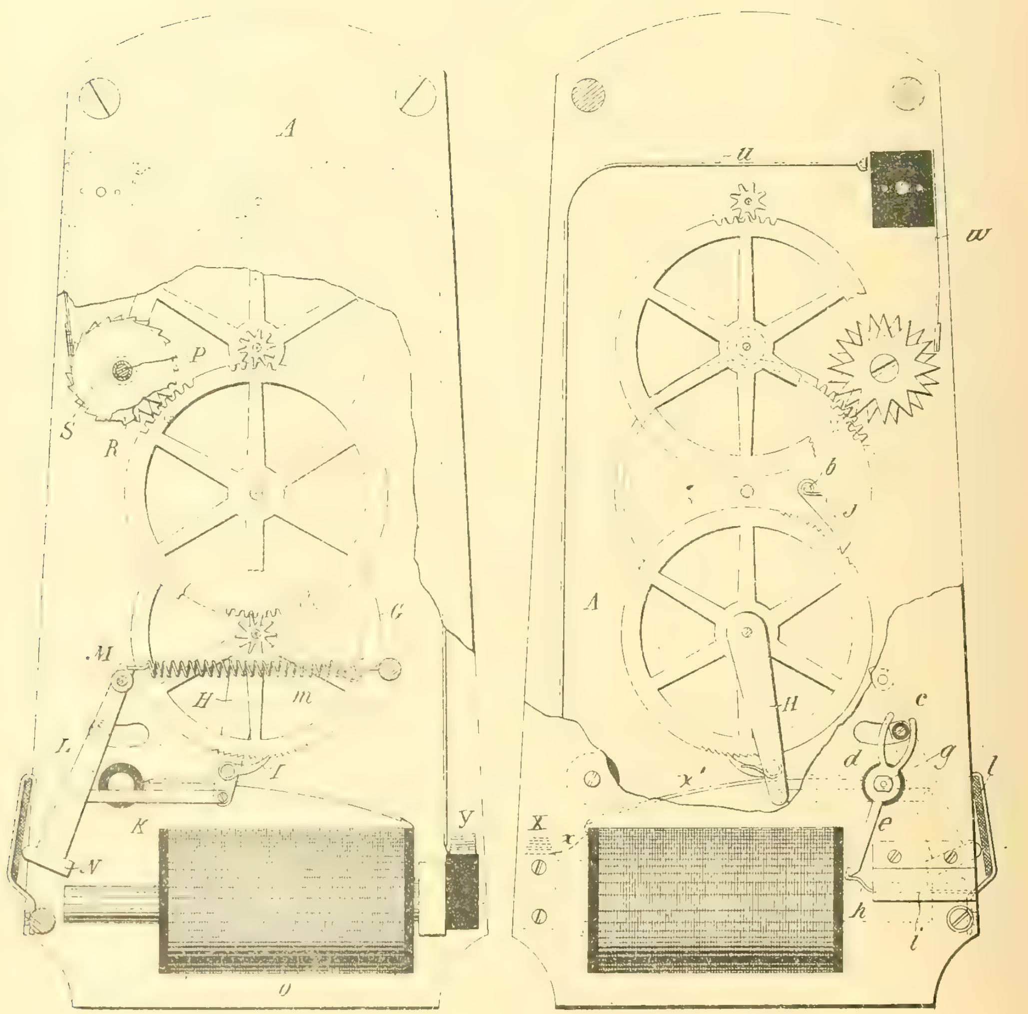
(No Model.) 2 Sheets—Sheet 1.

F. M. SCHMIDT.

ELECTRIC SELF WINDING CLOCK.

No. 475,809. Patented May 31, 1892.

Fig. 1 Fig. 2



Witnesses

M. G. Tracy.

Inventor:

Frederick M. Schmidt

By Duncan & Page

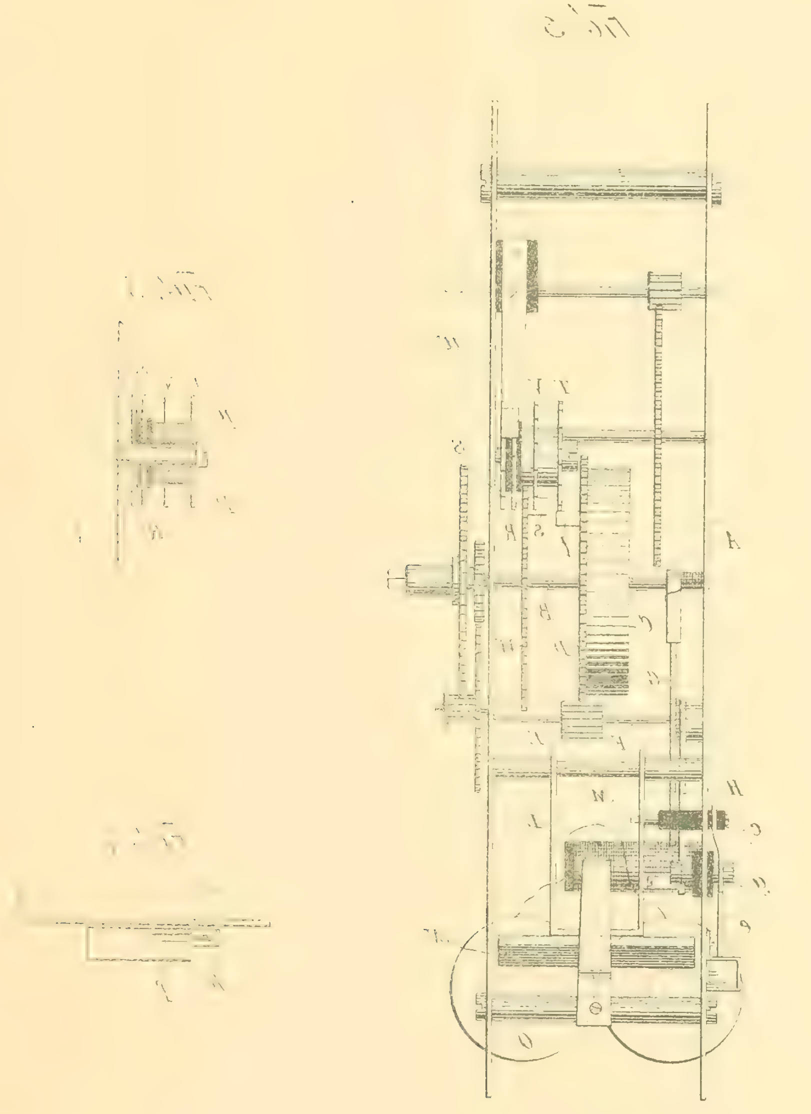
Attorneys.

(No Model.)

F. M. SCHMIDT.

ELECTRIC SELF WINDING CLOCK.

No. 475,809. Patented May 31, 1892.



(No Model.) 2 Sheets—Sheet 2.

F. M. SCHMIDT.

ELECTRIC SELF WINDING CLOCK.

No. 475,809. Patented May 31, 1892.

Fig. 3

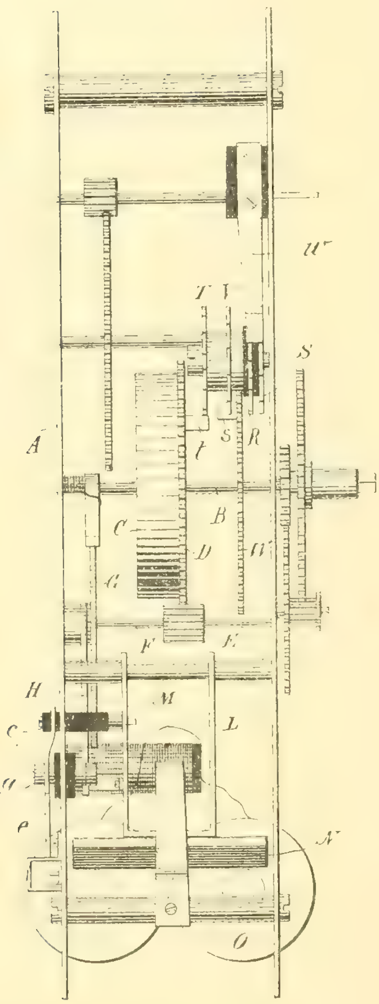


Fig. 5

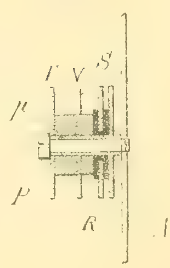
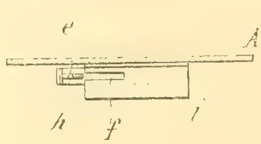


Fig. 4



Witnesses
Wm. Buckler,
M. G. Tracy.

Inventor
Frederick M. Schmidt
By Duncan & Page
Attorneys.

UNITED STATES PATENT OFFICE.

FREDERICK M. SCHMIDT, OF BROOKLYN, NEW YORK.

ELECTRIC SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. [illegible], dated May 31, 1892.

Application filed [illegible], 1891. Serial No. [illegible]. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK M. SCHMIDT, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Self-Winding Clocks, of which the following is a specification, reference being had to the drawings accompanying and forming a part of the same.

The invention subject of my present application is an improvement in self-winding clocks, the improvements being confined to the electrical winding mechanism and the means for controlling the operation of the same. I employ, in combination with a clock-train and mainspring, a reciprocating motor, which at given intervals, determined by the movement of the clock-train, is brought into and maintained in operation for a sufficient length of time to rewind the said spring. With this motor I use a circuit-controller of new and improved character and a form of switch that is independent of the train, but [illegible] and operated thereby for controlling the circuit, including the motor.

Referring to the accompanying drawings for a more particular description of the features of construction and operation of my invention, Figure 1 is a front view in elevation of my improved clock, with portions of the frame cut away. Fig. 2 is a similar view of the rear of the same. Fig. 3 is a side elevation of the complete instrument. Fig. 4 is a top view of a detail of the mechanism forming part of the circuit-breaker. Fig. 5 is a section of the circuit-controller.

Any suitable form of clock mechanism may be employed, and I have shown in illustration a frame A, of usual construction, designed to contain a train having the usual escapement, pendulum, and other parts of an ordinary clock.

B is the main or driving arbor, on which is placed the going-barrel C, containing the mainspring. A cog-wheel D, fixed to the barrel, engages with a pinion E on an arbor F. On this latter arbor is a ratchet-wheel G, and turning loosely on the same arbor is an arm H, that carries a spring-pawl I, that engages with the teeth of the wheel G. The wheel G is locked against backward movement by a spring-pawl J, pivoted on a stud j, set in the back plate. The lower or free end of the swinging arm H is connected by a link K with the frame or lever L, that swings on a shaft M and carries at its lower end a soft-iron armature N. This armature is acted upon by and sweeps over the pole [illegible] of an electro-magnet O, mounted on the frame A, and when the circuit of said magnet is properly made and broken it has a reciprocating movement to and from the same that imparts motion to the ratchet-wheel G, and hence winds the mainspring of the clock.

The action of the magnet is controlled by the movements of the armature-frame in one part by the following means: An insulated stud c, set in the frame L, extends through a slot d in the rear plate of the frame and engages with the [illegible] end of a lever e, pivoted on a stud f, insulated from the frame of the clock. The free end of this lever encounters a spring-plate h, preferably secured to the metal frame within a small casing or box i, attached to the frame and from which the end of the said plate h projects. To permit sufficient play in the lever e, a slot [illegible] may be cut in the end of the lever [illegible] when necessary. As the armature and its frame or support swing back and forth a corresponding motion is imparted to the lever e, and the plate h is so placed [illegible] in such manner that the lever e will come in contact therewith while the armature is withdrawn from the magnet and leave it during the movement of the armature toward the magnet.

By means of the circuit connections hereinafter described the magnet is energized while the plate h and lever e are in contact and [illegible] while such contact is interrupted, but any appreciable movement of the armature toward the magnet will result in imparting movement to the ratchet-wheel G, and, as will hereinafter be described, such movements, without regard to their individual extent, will continue until the mainspring has been rewound to just the extent it has run down. In practice I cause the lever e and plate h to break contact before the armature has reached its limit of movement, utilizing the momentum acquired by the armature to [illegible] the end of its path of movement.

A flexible plate or strip l, covered with [illegible]

or some [illegible] insulating material is used to receive the impact of the [illegible] on its back stroke. [illegible] connected to the frame and [illegible] respectively, with [illegible] from the magnet when the latter is [illegible].

P is a stud fixed to the front plate of the frame A and carrying a sleeve p, to which are secured two star-wheels T V and two disks or wheels R S. The latter are formed with inclined teeth that alternate in position, the end of a tooth on one disk coming opposite the space between two teeth on the other. One of these disks, as R, is insulated from the sleeve and other parts of the clock, while the other is in metallic contact with the sleeve, and hence with the clock-frame. The star-wheels T V have the same number of teeth as the toothed disks R S, and they are correspondingly placed, so that their teeth alternate.

On a cog-wheel W on the main or hour arbor B is a projection or tooth s, extending laterally into the path of the teeth of the star-wheel V, and so arranged that each revolution of the wheel W will move the star-wheel V, and with it the sleeve and parts attached thereto, through one-half the space between two of its teeth, or through a space equal to the distance between one tooth on the wheel V and the next adjacent tooth on wheel T. On the cog-wheel D is a similar projection t, adapted to engage with the teeth of the star-wheel T and move the same one-half the space between two of its teeth.

From one of the insulated binding-posts, as X, of the clock [illegible] conveys the current to the magnet [illegible] path is [illegible] continued through wire [illegible] to the insulated stud g, carrying the lever [illegible]. When the lever [illegible] is in contact with [illegible] the current is continued [illegible] the frame to the stud P and [illegible].

A spring-contact strip [illegible] insulated [illegible] bears on one or the other of the disks R S at all times, but never on both, by reason of the position of their respective teeth [illegible]. The spring [illegible] is connected [illegible] with the opposite binding-post [illegible].

The operation of the instrument is as follows: As the clock [illegible] by the mainspring [illegible] the wheel W comes [illegible] the teeth of the star-wheel V and turns the same, and with it the disks R S, so that the spring [illegible], which at the time rested upon [illegible] the teeth of the insulated disk R, slips onto one of the teeth of the disk S. [illegible] position of the lever [illegible] is that shown [illegible] through the motor [illegible]. The latter will then [illegible] until the circuit is [illegible]. This occurs when the wheel D has made [illegible] through a complete revolution [illegible] the wheels T V R S one step, or so that the spring w slips from wheel or disk S to disk R. In this condition the parts remain until the end of the hour or until the wheel W has made another revolution.

It will be seen that the circuit-controlling device composed of the star-wheels and serrated disks R S, while operated by is independent of the train or clock mechanism proper. From the nature of its position a much better contact is secured than is done in ordinary clocks through the oil-bearings of the arbors.

The winding device in my improved clock is called upon to do but little work and the mechanical advantage gained by acting upon the going-barrel or spring indirectly or through the wheel C renders the operation of rewinding much more certain, beside enabling me to rewind at any intervals of time that I wish.

What I now claim as my invention is—

1. In a self-winding clock, the combination, with a winding-motor and the train operated thereby, of a circuit-controller for the motor-circuit, having alternate insulating and conducting sections and a contact bearing thereon, the said circuit-controller being independent of the train, but adapted to be moved step-by-step by the alternate engagement therewith of one of the wheels of the train and a part connected with the going-barrel, as set forth.

2. In a self-winding clock, the combination, with the winding-motor and the train, of two star-wheels and two ratchet wheels or disks, all fixed to the same rotary support, with their teeth alternately disposed and one ratchet-wheel being insulated, a spring-contact bearing at all times on one or the other of said ratchet-disks, according to their position, a pin or projection on one of the wheels of the train in position to engage with the teeth of one of the star-wheels and a pin on a wheel moving with the going-barrel for engaging with the other star-wheel, as herein set forth.

3. The combination, in a self-winding clock, with the winding-motor and train, of the star-wheels T V and the ratchet-disks R S, carried by the same sleeve, with their teeth alternately disposed and mounted on a stud independently of the train, the contact strip or spring w, bearing on the disks R S alternately as the latter are revolved, a projection or tooth on a wheel W on the hour-arbor, adapted to engage with the star-wheel V and by each revolution of the wheel W to shift the spring w from a tooth on disk R, which is insulated, to a tooth on disk S, which is connected with the circuit of the motor, and a tooth or projection on wheel D, connected with the going-barrel and adapted to engage with the star-wheel T and by each revolution of the wheel D to shift the contact w from disk S to disk R, as set forth.

4. In a self-winding clock, the combination, with the mainspring and barrel, of a recipro-

cating motor consisting of an electro-magnet, a vibrating armature-lever, and means for transmitting the movement of the same to the barrel, a pivoted contact-lever engaged and oscillated by the armature-lever, and a contact-plate in the circuit with the motor-magnet and contact-lever and formed or bent, as described, whereby the contact-lever will be brought into engagement therewith by the withdrawal of the armature from the magnet and out of engagement by the approach of the armature to the magnet, as set forth.

5. The combination, with a clock-train and a circuit-controller arranged to be brought to position by the running down of the train to close the circuit of a winding-motor and by the winding up of the mainspring to break said circuit, of a reciprocating motor composed of a magnet, an oscillating armature connected by a pawl and ratchet-wheel with the barrel, the insulated contact-lever *c*, having a bifurcated end engaged by an insulated stud on the armature-lever, and the contact-strip *h*, with which the lever *c* is adapted to engage, the strip being bent or formed in such manner that the lever *c* will be carried out of contact therewith by the movement of the armature-lever and before the said lever has reached its forward limit of movement, as herein set forth.

FREDERICK M. SCHMIDT.

Witnesses:

ERNEST LASCHE,

FAHIE BERKELEY

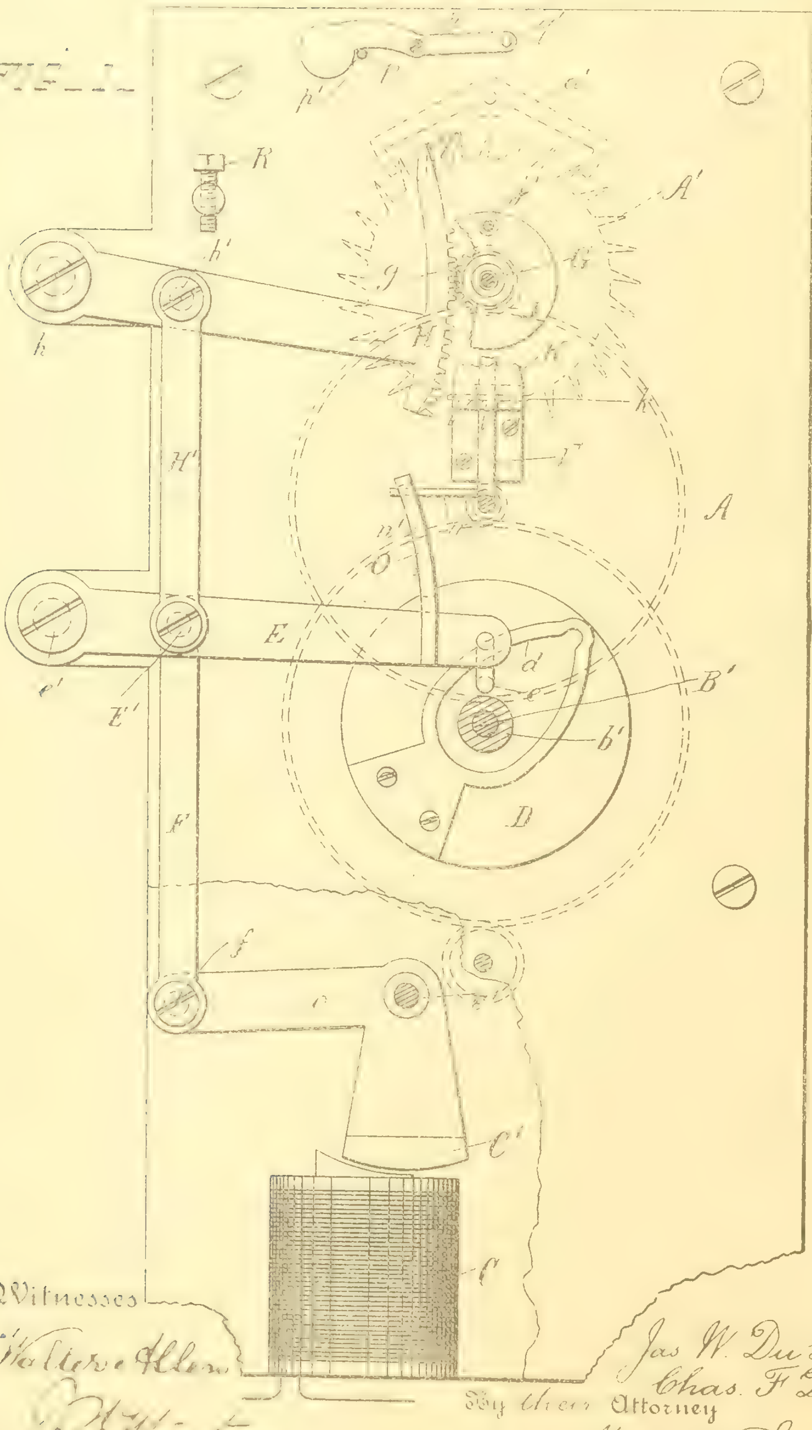
(No Model.) 2 Sheets—Sheet 1.

J. W. & C. F. DU LANEY.

ELECTRIC CLOCK SYNCHRONIZER.

No. 477,049. Patented June 14, 1892.

FIG. 1.



Witnesses

Walter Allen

[illegible]

Inventors

Jas. W. Du Laney, and

Chas. F. Du Laney

By their Attorney

Herbert W. T. Jenner.

(No Model.) 2 Sheets—Sheet 2.

J. W. & C. F. DU LANEY.

ELECTRIC CLOCK SYNCHRONIZER.

No. 477,049. Patented June 14, 1892.

FIG_2_

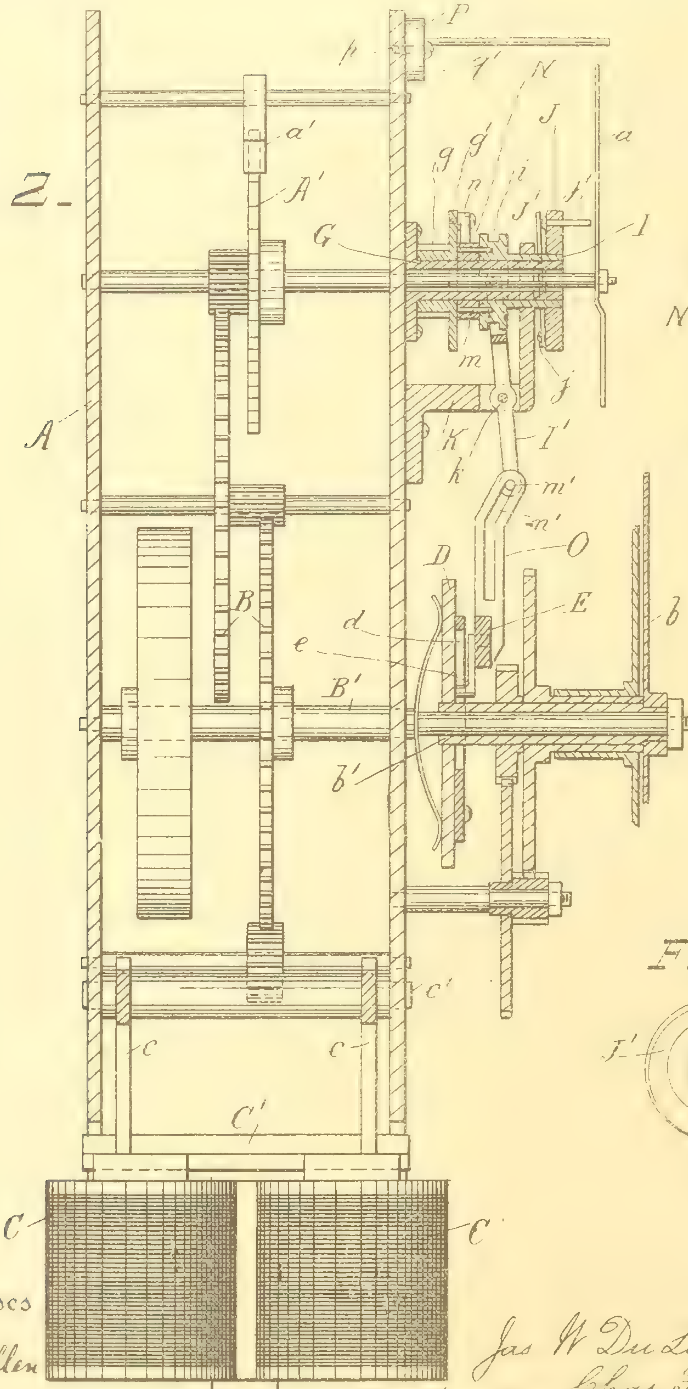


FIG_3_

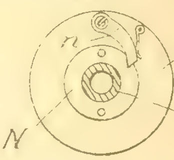


FIG_4_

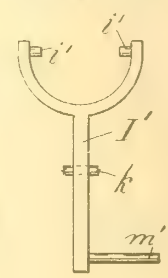
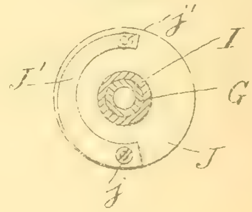


FIG_5_



Witnesses
Walter Allen
J. W. Hister

Inventors.
Jas W. Du Laney, and
Chas F. Du Laney.
By their Attorney
Herbert W. T. Jenner.

UNITED STATES PATENT OFFICE.

JAMES W. DU LANEY AND CHARLES F. DU LANEY, OF CANTON, OHIO.

ELECTRIC CLOCK-SYNCHRONIZER.

SPECIFICATION forming part of Letters Patent No. 477,049, dated June 14, 1892.

Application filed September 4, 1891. Serial No. 404,723. (No model.)

To all whom it may concern:

Be it known that we, JAMES W. DU LANEY and CHARLES F. DU LANEY, citizens of the United States, residing at Canton, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Electric Clock-Synchronizers; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to devices for synchronizing clocks; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings, Figure 1 is a front view of a clock provided with synchronizing devices according to this invention. Fig. 2 is a side view of the clock, showing the synchronizing devices in section. Figs. 3, 4, and 5 are respectively detail views of the notched disk and pawl, the forked lever, and the spring for holding up the pin which sets the seconds-hand.

A is the frame of a clock. A′ is the escapement-wheel. *a* is the seconds-hand, and *a′* is the escapement-pallet. B is the train of driving-wheels, and B′ is the barrel-shaft. A sleeve *b′* is journaled on the barrel-shaft and carries the minute-hand *b*. All of these parts and their connections are of any ordinary approved construction.

C are electro-magnets secured to the frame, and C′ is an armature secured to one end of the bell-crank lever *c*, which is pivoted on the pin *c′*.

D is the disk, secured upon the sleeve *b′*, and *d* is a cam-shaped loop secured to the said disk.

E is a lever pivoted to the frame at one end by the pin *e′* and provided at the other end with the bent pin *e*, which engages with the said loop.

F is a link, which is pivoted to the lever E by the pin E′ and to the bell-crank lever by the pin *f*.

The electro-magnets of each clock in the series of clocks to be synchronized are simultaneously placed in circuit with a battery at periodic intervals by mechanism which does not form a part of the present invention, and is therefore not described herein. Each time the magnets are excited the armature is attracted and the lever E is raised. The pin *e* bears against the loop *d* and turns it and sets the minute-hand, provided the minute-hand is not more than fifteen minutes too fast or too slow. The loop is preferably arranged to set the hand at the hour; but a setting of oftener than once each hour can be had by duplicating the cam-shaped loop.

The seconds-hand is set at the same time with the minute-hand in the following manner: A sleeve G is secured to the frame and surrounds the escapement-wheel shaft without touching it, so that the action of the escapement is not interfered with. A toothed pinion *g* is journaled on this sleeve and is provided with a flange *g′*. A toothed sector H is pivoted to the frame by the pin *h* and gears into the pinion *g*. H′ is a link, which is pivoted to the sector H by the pin *h′* and to the lever E by the pin E′. The sector turns the pinion one revolution each time the lever E is raised by the electro-magnets to set the minute-hand.

I is a tube sliding on the sleeve G and provided with a groove *i* at one end for the pins *i′* of the forked lever I′ to engage with. A disk J is secured to the other end of the tube I and is provided with a sliding pin *j′*, which projects from the face of it.

J′ is a curved spring, which is secured to the disk J by the screw *j* and bears against the head of said pin.

K is a cranked bracket secured to the frame. The upper end of this bracket forms a bearing, which supports the tube I, and the forked lever I′ is pivoted on the pin *k*, which projects from the bracket K.

The tube I is provided with long pins *m*, which slide back and forth in holes in the notched disk N, which is journaled on the sleeve G, so that the tube I and disk N always revolve together. A spring-actuated pawl *n* is pivoted to the flange *g′* of the pinion *g*. The lower end of the forked lever I′ is provided with a projecting pin *m′*, which engages with the inclined upper portion of the slot *n′* in the vertical arm O, which projects from the lever E.

P is a lever pivoted on the pin *p* at the upper part of the frame and normally resting on the stop *p′*. When the sector H is raised, a

projection q on its upper end trips up the heavy end of the lever P and lowers the pin q', which projects from the other end of the lever into the path of the seconds-hand.

The action of the device is as follows: When the lever E is raised, the inclined portion of the slot n' turns the forked lever on its pivot and thrusts the pin j' into the path of the seconds-hand, at the same time partially withdrawing the pins m from the holes in the disk N. The sector, which is coupled to the lever E, turns the pinion g, and the pawl n turns the disk N and tube I and causes the pin j' to describe a circle and to set the seconds-hand. When the sector and the lever E are lowered, the pin j' is withdrawn from the path of the seconds-hand and remains stationary, because the pawl n permits the pinion g to be revolved backward without revolving the disk N. The lever P is tripped to bring the pin q' in front of the seconds-hand just before it is set, so that the momentum of the seconds-hand may not carry it past the correct position, and the pin q' is automatically raised out of the path of the seconds-hand as soon as the setting is accomplished. The pin j' is made retractible and is provided with a spring, so that the seconds-hand may not be injured if the hand should happen to be in front of the said pin at the moment of setting the clock. When the pin j' is pushed out against the hand, the spring permits the pin to slide back until it has been moved past the hand by the sector and pinion.

R is an adjustable stop secured to the frame and adapted to prevent the sector from being raised too high.

What we claim is—

1. In a clock-synchronizer, the combination, with the cam-shaped loop operatively connected with the minute-hand, of the pivoted lever provided with a setting-pin engaging with the said loop, the electro-magnets, the pivoted bell-crank lever carrying the armature at one end, and the link connecting the other end of the said bell-crank lever with the aforesaid lever, substantially as and for the purpose set forth.

2. In a clock-synchronizer, the combination, with the electro-magnets and the pivoted toothed sector operatively connected with the armature of the said magnets, of the stationary sleeve encircling the shaft of the seconds-hand, the pinion journaled on the said sleeve and gearing into the said sector, and the revoluble sliding tube operatively connected with the said pinion and provided with a pin adapted to be thrust forward into the path of the seconds-hand, whereby the said hand may be set, substantially as set forth.

3. In a clock-synchronizer, the combination, with the electro-magnets and the pivoted toothed sector and the pivoted lever operatively connected together and to the armature of the said magnets, of the cam-shaped loop for setting the minute-hand, adapted to be operated by a pin projecting from the said lever, the stationary sleeve encircling the shaft of the seconds-hand, the pinion journaled on the said sleeve and gearing into the said sector, the revoluble sliding tube operatively connected with the said pinion and provided with a pin for setting the second-hand, and a lever operated by the minute-hand lever and adapted to thrust the said pin forward into the path of the seconds-hand, substantially as set forth.

4. In a clock-synchronizer, the combination, with a stationary sleeve encircling the shaft of the seconds-hand, of a revoluble sliding tube journaled on the said sleeve and provided with a retractible spring-pressed pin adapted to set the hand and to be pushed back when pressed against the hand, substantially as set forth.

5. In a clock-synchronizer, the combination, with the pivoted toothed sector for setting the seconds-hand, of a pivoted trip-lever provided with a projecting pin and adapted to be raised by the said sector, whereby the said pin may be momentarily placed in front of the seconds-hand to prevent it from being carried past the setting-point, substantially as set forth.

6. In a clock-synchronizer, the combination, with the stationary sleeve encircling the shaft of the seconds-hand, of the driving-pinion provided with a pawl, the notched disk engaging with the said pawl, and the sliding tube provided with long pins sliding in holes in the said disk and a pin for setting the seconds-hand, the said pinion, disk, and tube being journaled on the said sleeve, substantially as and for the purpose set forth.

7. In a clock-synchronizer, the combination, with the stationary sleeve encircling the shaft of the seconds-hand, of the driving-pinion and the revoluble sliding tube operatively connected together and journaled on the said sleeve, the said tube being also provided with a pin for setting the seconds-hand, a toothed sector for revolving the said pinion and tube, a pivoted lever provided with pins engaging with a groove in the said tube, and the lever for setting the minute-hand, provided with an arm having an inclined slot adapted to engage with a pin on the said pivoted lever and to cause it to slide the tube upon the said sleeve, substantially as and for the purpose set forth.

In testimony whereof we affix our signatures in presence of two witnesses.

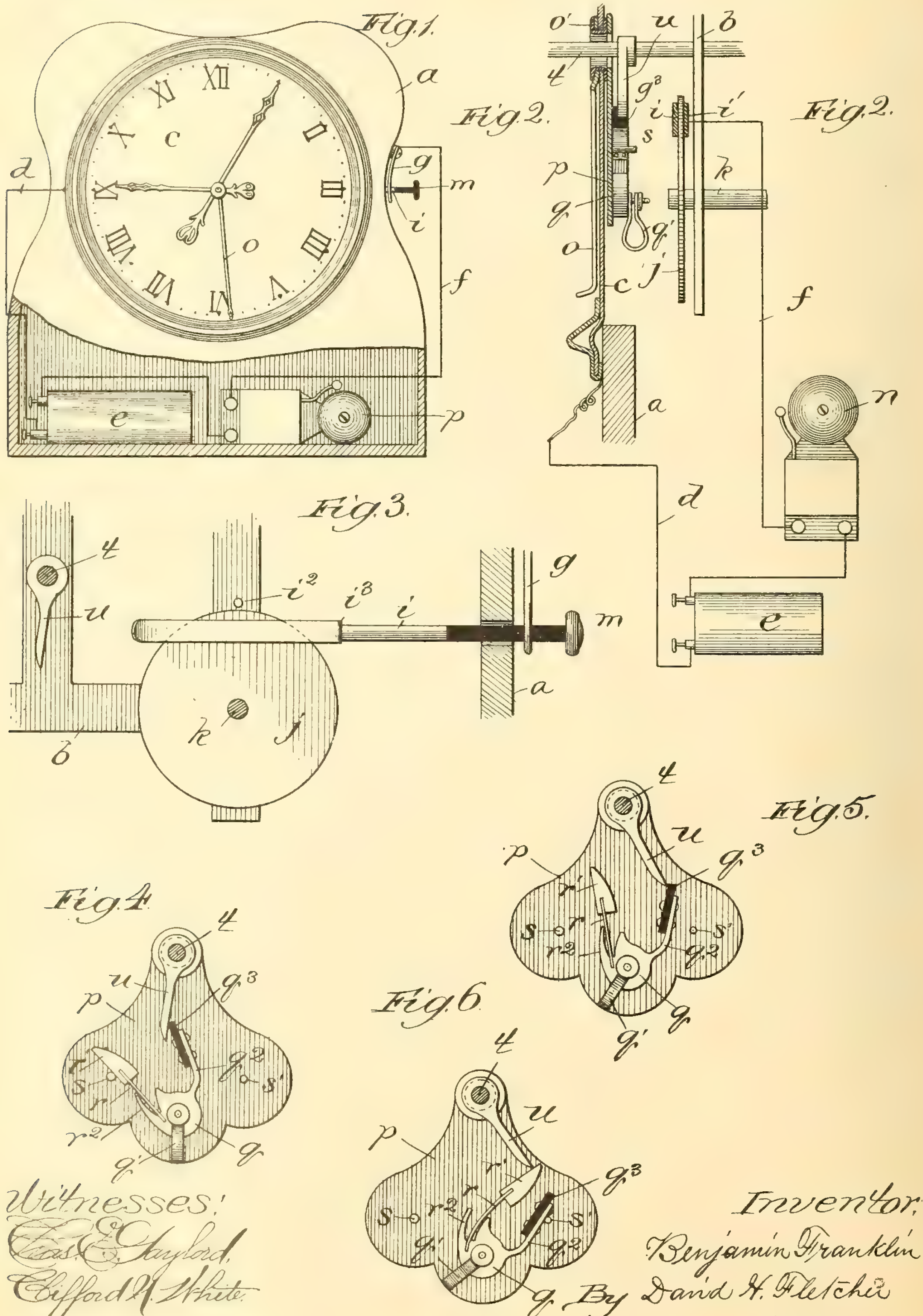
JAMES W. DU LANEY.
CHARLES F. DU LANEY.

Witnesses:
CHARLES S. PERRY,
ARTHUR S. WHEELER.

(No Model.)

B. FRANKLIN.
ELECTRIC ALARM CLOCK.

No. 477,206. Patented June 21, 1892.



Witnesses:
Chas. E. Gaylord.
Clifford N. White.

Inventor:
Benjamin Franklin
By David H. Fletcher
Att'y

United States Patent Office.

BENJAMIN FRANKLIN, OF CHICAGO, ILLINOIS, ASSIGNOR OF THREE-FOURTHS TO DAVID H. FLETCHER, CALVIN R. BEACH, AND GEORGE H. MERRIELL, OF SAME PLACE.

ELECTRIC ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 477,206, dated June 21, 1892.

Application filed September 12, 1891. Serial No. 405,493. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN FRANKLIN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Alarm Attachments for Clocks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a front elevation of a clock embodying the features of my invention, the base being partly in section to show the battery and bell. Fig. 2 is a vertical sectional view of the clock-works, in which the battery and gong are shown, with their electrical connections, in diagram. Fig. 3 is an enlarged detail view, partly in section, of a portion of the clock-frame, showing my improved circuit maker and breaker. Fig. 4 is a rear view of the plate upon the back of the dial, showing my improved circuit-closing mechanism. Fig. 5 is a like view showing the parts in a different position, and Fig. 6 is a like view showing the parts in still different relative positions.

Corresponding letters of reference in the different figures indicate like parts.

The general object of my invention is to provide an electric alarm mechanism which may be cheaply and simply constructed and readily applied to clocks without necessitating a change of construction in the latter.

A further object is to render said alarm mechanism in a measure automatic, whereby it may require no winding or other attention to enable it to sound an alarm at a predetermined time. Moreover, I desire to so construct said alarm that it may be set in the most simple manner and caused to act for an indefinite period after the time at which the alarm commences to sound, unless the electric circuit is sooner broken by the act of the user, all of which is hereinafter more particularly described and claimed.

Referring to the drawings, *a* indicates an ordinary clock-case, within which is placed the frame *b* for the support of the usual clock mechanism. The dial *c*, which is formed from sheet metal, is connected by means of a wire *d*, Figs. 1 and 2, with one pole of a battery *e*, which by preference is located and made to conform to the space within the base of the clock. To the opposite pole of the battery is attached a wire *f*, which is connected with a switch, the swinging arm *g* of which (see Figs. 1 and 3) is adapted to be brought into contact with or separated from a metallic rod *i*, one end of which is adjusted to project through and slide loosely within the case *a* of the clock, while the other is in frictional contact with a metal disk *j*, mounted upon the winding-arbor *k*. The rod *i* is split or forked at the end, which is connected with the disk *j*, forming springs i' i', which clamp the disk with a slight frictional contact. The object of thus connecting the disk and rod is to enable the former by its rotation to slide the rod outwardly a given distance for the purpose of closing an electric circuit, as hereinafter stated. A pin i^2, Fig. 3, serves to prevent the bar from being lifted up and thrown out of contact with the disk as the latter is rotated, while a stop i^3 serves to limit the outward movement of the rod. Upon the outer end of the rod *i* is a knob *m*, formed from vulcanite or other insulating material, a portion of which is flush with the rod, so that as the whole is moved back and forth the spring or arm *g* of the switch is in frictional contact either with the metal or insulating material. The usual electric bell *n* is interposed in the electric circuit, as clearly shown in Figs. 1 and 2. The clock-dial *c* is separated in the usual way from the frame *b*, and hence the electric circuit is normally open. An alarm-hand *o*, Figs. 1 and 2, is loosely attached to the dial by means of an eyelet o', Fig. 2, which connects said hand with a metal plate *p* upon the back of the dial and in frictional contact therewith. Upon the plate *p*, Figs. 2, 4, 5, and 6, is pivoted a collar *q*, which is held in frictional contact with the plate *p* by means of a spring q', thus enabling said collar to maintain any given position in which it is placed. An arm q^2 is rigidly attached to or formed upon the collar *q* and is provided with an insulating plate or point q^3 upon its extremity. A light spring *r* is also attached to said collar, to the end of which is attached a metal block r' of a sufficient weight that when the spring is bent and suddenly released the momentum of the weight

r' will overcome the friction of the collar upon the plate p and move the whole in the direction of the recoil. An arm r^2 is preferably provided upon the collar q, with which the spring is brought into contact in its recoil, thus giving the weight in its movement a more positive action upon the collar. Stops s s' serve to limit the oscillatory movement of the arms and collar q.

Attached to the hour-hand arbor t is a radial arm u, which is adapted to engage in turn with the insulated point q^3 of the arm q^2 and also with the weighted block r', which is intended as an electric contact-point and is normally in the position shown in Fig. 4. The object of these two pointed arms—one insulated and the other not—is to enable the electric circuit to be closed automatically once in twenty-four hours by the revolution of the hour-hand arbor without the interposition of extra gears or other mechanism. The hand o and plate p are rigidly attached to each other and are relatively so adjusted that when the hand o is placed upon a given hour the arm u is brought into contact with the point r' at that time. Assuming the point r' to be in its normal position, as shown in Fig. 4, the first revolution of the hour-hand arbor causes the arm u to engage the insulated point q^3 and move it from the position shown in Fig. 4 to that indicated in Fig. 5, where it remains for the next twelve hours. At the end of that time the arm u is brought into contact with the point r', when the electric circuit is closed and the alarm is sounded until the point r' slips off from the end of the arm u or until the circuit is otherwise broken, as hereinafter stated. The pressure of the arm u bends the spring r, and as soon as the point r' leaves the end of the arm the recoil of the spring throws said weighted contact-point in an opposite direction with such force that its momentum overcomes the friction of the collar q and moves the same until the point r' is returned to its normal position, as shown in Fig. 1. Thus it will be seen that with every second revolution of the hour-hand a contact is made with the point r', and when released said point is automatically returned by its own momentum to its initial position, which movement may be repeated indefinitely.

When constructed as shown, it is obvious that the arm u and point r' are liable to remain in contact for several minutes, during which time the alarm is caused to sound. By pushing in the rod i so that the spring g is in contact with the insulated portion of the knob the circuit is broken and remains so until the point r' is released; but before another revolution of the hour-hand the winding-arbor k will have moved sufficient to push out the rod i far enough to again bring said rod in contact with the spring g, and thus enable the circuit to be again closed when the parts u and r' are in contact. The advantage of this construction is that the alarm may be caused to sound for a long time if necessary, or it may be stopped at will by breaking the circuit in the manner stated. If from any cause it is desired to prevent the alarm from sounding at all, the spring or switch g may be moved laterally out of contact with the rod i or the insulating material thereon.

My improved device may be readily attached to any clock without changing its construction.

Having thus described my invention, I claim—

1. The combination, with a clock, of a battery electrically connected with the hour-hand arbor and dial, respectively, an electric bell interposed in circuit therewith, a movable alarm-hand having a metallic connection with the dial, contact-points in the rear of said dial, arranged to move in unison with and to bear a fixed relation thereto, and an arm upon the hour-hand arbor in operative proximity to said contact-points, substantially as shown and described.

2. The combination, with a clock, of a battery, means for electrically connecting the same with the hour-hand arbor and dial, respectively, an electric bell interposed in circuit with said battery, an alarm-hand in connection with said dial, a circuit maker and breaker located behind and in metallic connection with said dial, an arm or contact-point upon the hour-hand arbor, adapted to engage therewith, a disk mounted upon the winding-arbor, a sliding rod in contact therewith in normal circuit with the battery, and an insulating device upon said rod, whereby a change of position thereof may make or break said electric circuit, substantially as shown and described.

3. The combination, with a clock having a battery and electric bell normally in circuit with the dial and hour-hand arbor thereof, of an oscillatory circuit maker and breaker in frictional contact with the dial and provided with radial arms, one of which is insulated at its end and the other of which consists of a metallic weight mounted upon a spring, means for limiting the oscillatory movement of said device, an arm upon the hour-hand arbor in operative proximity to said arms, and an alarm-hand in metallic connection with said dial, substantially as shown and described.

4. The combination, with a clock having a battery and electric bell normally in circuit with the dial and hour-hand arbor thereof, of an alarm-hand rigidly connected with a plate in metallic connection with the back of the dial-plate, an oscillatory circuit-making device, as described, in frictional contact with said plate, and a metallic arm mounted upon the hour-hand arbor and in operative proximity to said circuit making and breaking device, substantially as shown and described.

5. The combination, with a clock having a battery and electric bell normally in circuit with the dial and hour-hand arbor thereof, of the alarm-handle o, revoluble plate p in metallic contact with the dial, collar q in resil-

ient frictional contact with said plate, insulated point q^3 and weighted metallic point r', attached to said collar, substantially as set forth, means for limiting the oscillatory movement of said collar, and arm u in operative proximity to said points q^3 and r', substantially as specified.

6. The combination, with a clock having its dial and hour-hand arbor in electric circuit with a battery and bell, of an alarm-hand, a revoluble plate connected therewith and with the dial, an oscillatory circuit making and breaking device pivotally mounted upon said plate, provided with two contact-points projecting radially from its axis, one of said contact-points being insulated and the other consisting of a metallic weight connected with its axis by a spring, and means for maintaining said axis in frictional contact with said plate, stops for limiting its movement, and an arm arranged to engage said points, respectively, as the hour-hand arbor is revolved, substantially as shown and described.

7. The combination, with a clock, of a battery, means for electrically connecting the same with the hour-hand arbor and dial, respectively, an electric bell interposed in circuit with said battery, an alarm-hand attached to said dial, an oscillatory circuit-maker in connection with said dial, an arm upon said hour-hand arbor, adjusted to engage with and actuate said circuit-maker, a disk mounted upon the winding-arbor, a sliding rod in frictional contact therewith and having an insulating material upon its outer end, and the contact-spring g, substantially as specified.

8. The combination, in an electric alarm attachment for clocks, of the disk j and rod i, the latter being provided with insulating material upon its outer end, whereby the rotation of said disk may tend to maintain said rod normally in circuit with the battery, substantially as specified.

In testimony whereof I have signed this specification, in the presence of two subscribing witnesses, this 20th day of August, A. D. 1891.

BENJAMIN FRANKLIN.

Witnesses:
D. H. FLETCHER,
C. R. BEACH.

(No Model.)

L. GÜNTHER.
TIMEPIECE FOR BOILING EGGS.

No. 477,252. Patented June 21, 1892.

Fig. 1.

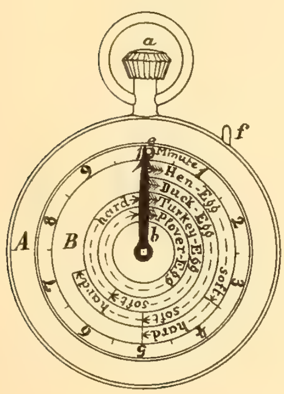


Fig. 2.

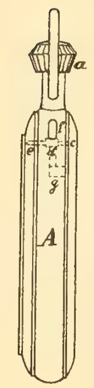


Fig. 3.

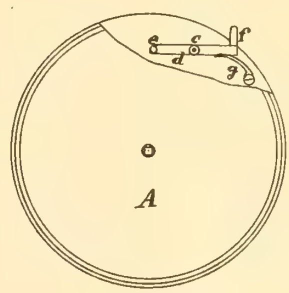
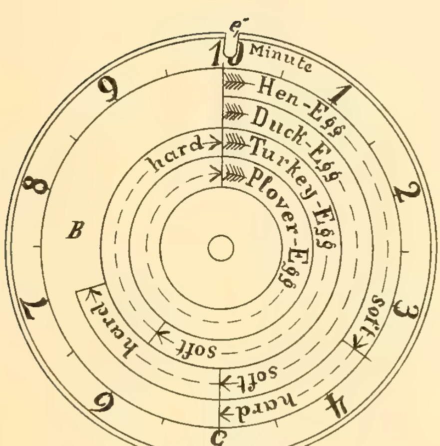


Fig. 4.



Attest:-
Walter E. Allen.
George E. Cruse

Inventor:-
Ludwig Günther.
By Knight Bros.
Attorneys.

UNITED STATES PATENT OFFICE.

LUDWIG GÜNTHER, OF SCHWERIN, GERMANY.

TIMEPIECE FOR BOILING EGGS.

SPECIFICATION forming part of Letters Patent No. 477,252, dated June 21, 1892.

Application filed August 12, 1891. Serial No. 402,450. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG GÜNTHER, engineer, of Schwerin, in the Grand Duchy of Mecklenburg-Schwerin and German Empire, have invented a new and useful Egg-Watch, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to an egg-watch.

The object of the present invention, as represented in the annexed drawings, is to show the necessary time required for the boiling of eggs used as human food—such as hen-eggs, duck-eggs, turkey-eggs, and plover-eggs. It can also be used for marking the time required for cooking, baking, and other culinary time-measurements.

In the annexed drawings, Figure 1 is a front view of the apparatus. Fig. 2 is a side view, and Fig. 3 shows the apparatus with the cover and dial removed. These three figures are full size. Fig. 4 shows the dial double full size.

In the case A there is an ordinary movement, which, like other movements, can be wound up at *a*. By means of the movement the hand *b* is moved round the dial once in ten minutes. In the casing there is also a small lever *d*, movable on the pin *c*, which bears at one end the stop-pin *e* and at the other end the pressing-pin *f*. (See Fig. 3.) The stop-pin *e* extends through the dial at the number "10." The pin *f* extends laterally out of the case. The lever *d* is normally kept in the position shown in the drawings by means of the spring *g*. The object of the lever arrangement is to stop the hand *b*, so that when it comes against the stop-pin *e* it is held at the number "10." If the pin *f* is pressed, the hand becomes free again, gives one turn, and again stops against the stop-pin *e*.

The dial B is divided into different circular divisions, which for easier reference can be painted in different colors. The outer circle, in which the incision *e'*, Fig. 4, for the stop-pin is shown, is divided into ten equal parts or minutes, and the different points marked with the numbers "1," "2," "3," to "10." The minutes are further divided into halves. The second circle shows the limits within which the hand has to run to boil the eggs of domestic hens—namely, to the first arrow-point if they are to be boiled soft and to the second if hard. The third circle shows the limits to which the hand has to reach in order to boil duck-eggs—namely, to the first arrow-point if soft and to the second if hard. In the same manner the fourth and fifth circles are arranged for turkey and plover eggs.

It is obvious that the apparatus can be made in the form of a watch or of a wall-clock. The principle is the same, and therefore only described here in one form.

The use of the egg-clock according to this invention has great advantages. When the eggs are placed in boiling water, the watch is taken in the hand, and by pressing the pin *f* the hand is allowed to run to the corresponding division or mark, upon reaching which the eggs are taken out. The hand will always after use move back to "10," and the watch is again ready for further use.

What I claim, and desire to secure by Letters Patent of the United States, is—

An egg-watch consisting of a case, a movement having a single hand or pointer, a stop mechanism for arresting the hand or pointer when the latter has run ten minutes and completed a single circle around the dial, and a dial having an outer circle divided into ten equal parts representing ten minutes of time and subdivided into half-minutes and also having a series of inner circles, on which are placed the names of articles to be cooked and arrows indicating the stages of cooking, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

LUDWIG GÜNTHER.

Witnesses:
PAUL FISCHER,
ALBERT ITYIGSOHN.

(No Model.)

LE ROY W. BALDWIN.

TIME LOCK FOR TOY BANKS.

No. 477,321. Patented June 21, 1892.

Fig. 1.

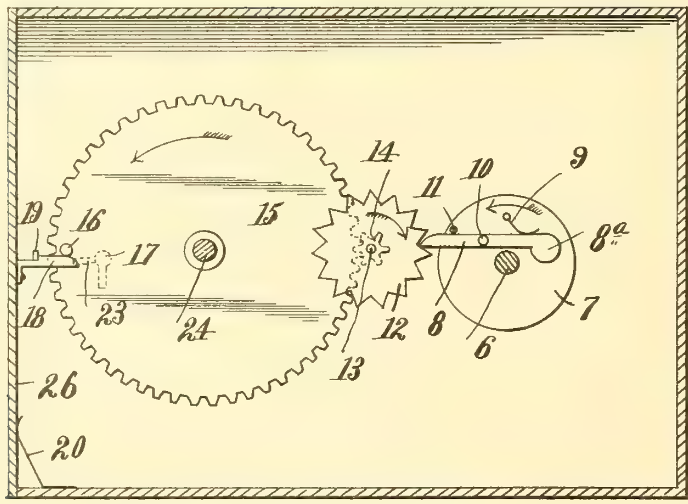


Fig. 2.

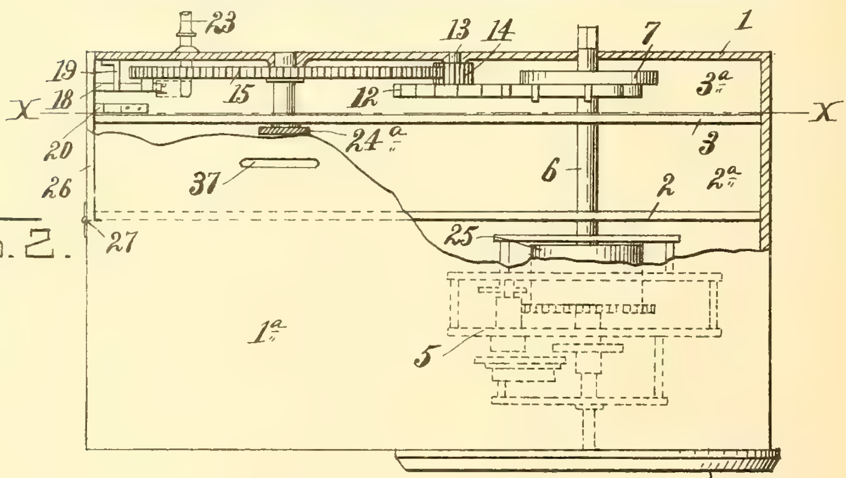
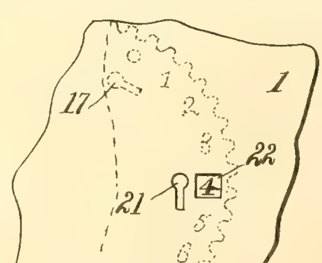


Fig. 3.



Witnesses
W. H. Courtland
Herbert L. Lugues

Inventor
LeRoy W. Baldwin
by A. P. Smith
his Atty.

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

United States Patent Office.

LE ROY W. BALDWIN, OF NEW YORK, N. Y.

TIME-LOCK FOR TOY BANKS.

SPECIFICATION forming part of Letters Patent No. 477,321, dated June 21, 1892.

Application filed March 15, 1892. Serial No. 424,941. (No model.)

To all whom it may concern:

Be it known that I, LE ROY W. BALDWIN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Toy Banks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of mechanism by which a receptacle for coin or other things may be locked and remain locked until the expiration of a certain time before it can be opened.

In the drawings, Figure 1 is a vertical section on line $x x$ of Fig. 2, showing a portion of a clock-case with a coin-receptacle and opening mechanism. Fig. 2 is a plan view of the same, a part of casing being broken away. Fig. 3 is a detail of a portion of the back of the casing.

The invention is designed, essentially, as an improvement on that disclosed in the application of William G. Spiegel, filed June 6, 1891, Serial No. 396,420.

Referring to the mechanism shown in the drawings, 1 is a casing which is divided by the partitions 2 and 3 into a chamber 1^a, in which the usual train of clock mechanism is contained, a second chamber 2^a, which serves as a receptacle for money of various kinds, and a third chamber 3^a, which contains the opening mechanism. The mainspring-shaft 6 goes through the three chambers and the casing 1.

In the clock-case proper is the clock-train 5, which operates the hands before the clock-face over which the glass 4 is placed in the manner common and well understood.

6 is the shaft to which one end of the clock mainspring 25 is attached, from which shaft the clock-train is driven and by which the spring is wound up. On this mainspring-shaft is the flange or disk 7, upon which is mounted the pawl 8 by the pivot 10. This pawl is normally held against the stop 11 by the weighted end 8^a or by the light spring 9. The pawl 8 engages with the teeth of the star-wheel 12 when the shaft 6 is turned in the direction indicated by the arrow, turning the star-wheel one tooth for every revolution of the shaft in the direction of the arrow, but slipping by when turned in the opposite direction.

On the same shaft 13 as the star-wheel 12 and rigid therewith is the pinion 14, which meshes with the teeth in the circumference of the dial-wheel 15. On this wheel is mounted the pin or stop 16, and the numbers "1," "2," "3," "4," &c., are marked one for every two teeth on the circumference. The door 26, opening into the chamber 2^a, has hinges 27 and a spring-catch 18, which snaps over a peg or projection 19 and locks the door when it is closed. When the catch 18 is forced down, as by pressure of the stop 16, the lock is released, and the spring 20 forces the door open. 37 is a slot, through which money may be deposited in the receptacle 2^a. The dial 15 revolves stiffly on the arbor 24. A milled head 24^a enables the operator to set the dial.

In a modified form of my invention a keyhole 17 (shown in dotted lines, Fig. 1) is cut in the dial 15, and another keyhole 21 is cut in the casing 1. When these two keyholes are in line, the key 23 may be introduced, and either alone or in conjunction with the pin 16 acts to open the lock in a manner easily understood. This gives a positive means of operating the locks.

The window 22 is formed in the back of the casing 1. The row of figures shown on the dial in Fig. 3 pass successively behind this window, and the operator can adjust the dial so that the figure representing the number of days for which the bank is to be set will appear behind the window. Then as the mechanism acts from day to day the remaining term of days can be read at any time, and no other record of dates is necessary. If the modification involving the key is used, the numbers read through the window will tell the operator when to insert the key.

The method of operating my invention is as follows: The bank being open, the dial 15 is turned around until the figure indicating the number of days for which it is to be set comes opposite the window 22, the shaft 6 having first been turned, so that the pawl 8 will not interfere with the revolution of the star-wheel. The door then being closed, locks itself and cannot be unlocked from the outside. Suppose the bank is set for ten days,

then every night when the clock is wound up the shaft 6 is given five revolutions, as is customary in cheap clocks, and the star-wheel 12 is turned one tooth at each revolution of the disk 7, or five in all. This gives the pinion 14 a third revolution and causes it to pass two teeth of the dial-wheel 15. After the clock has run twenty-four hours and been wound up again ten times, during which time ten days must have elapsed, a further winding up of the clock will force the pin or stop 16 against the catch 18 and release the lock, so that the door will fly open and the contents of the bank may be removed; or, as before stated, the key 23 may be inserted and the lock thus opened.

Either the dial 15 or the star-wheel 12 are so mounted that while moved by pressure of the hand they will stay where placed and not turn from external causes, such as simply moving the clock about. It is evident that the motion might be transmitted from any member of the clock-train other than the mainspring without departing from the spirit of my invention in its broadest scope, and that any adjustable train of mechanism and any other lock might be used, and that the coin-receptacle might be placed at the back or top instead of the middle of the clock-casing. Moreover, when the modification involving the key 23 is used, the window 22 might be dispensed with if the keyholes were large enough so that the operator could tell by looking in them when they were in line. This he could easily do, as they would so come into line while he was winding the clock.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. The combination of a coin-receptacle, a door for said receptacle, a lock on said door, an adjustable dial-plate inclosed in the same casing with said receptacle, a keyhole in said plate, a keyhole in said casing, a key which may be inserted to open the lock when the two keyholes are in line, a clock-train and gearing conveying motion from the mainspring-shaft of said clock-train to said dial, two members of said gearing having a pawl-and-ratchet connection whereby the dial is moved when the main shaft is turned backward to wind up the clock, but not when the shaft is turned forward to drive the clock-train, substantially as described.

2. The combination of a coin-receptacle, a door for said receptacle, a lock on said door, an adjustable dial-plate inclosed in the same casing with said receptacle, a keyhole in said dial-plate, a keyhole in said casing, a key which may be inserted to open the lock when the two keyholes are in line, a clock-train and gearing conveying motion from the mainspring-shaft of said clock-train to said dial, two members of said gearing having a pawl-and-ratchet connection whereby the dial is moved when the main shaft is turned backward to wind up the clock, but not when the shaft is turned forward to drive the clock-train, together with a window in the casing through which the figures on the dial may be read successively as the dial turns and its position thereby determined, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

LE ROY W. BALDWIN.

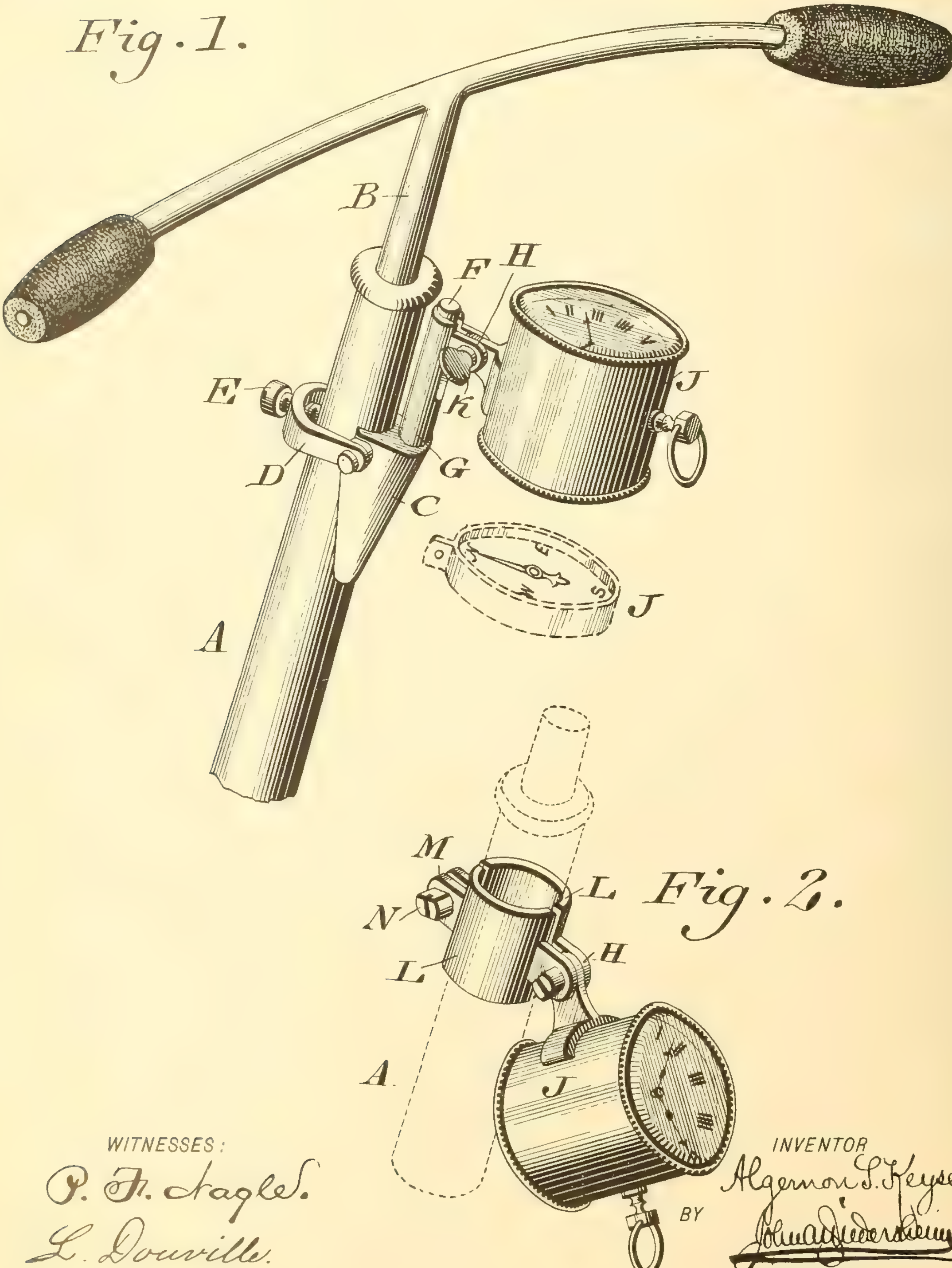
Witnesses:
A. P. SMITH,
J. M. LATTO.

(No Model.)

A. S. KEYSER.

CLOCK ATTACHMENT FOR BICYCLES.

No. 477,423. Patented June 21, 1892.



WITNESSES:

P. F. Nagle.

L. Douville.

INVENTOR

Algernon S. Keyser

BY

John A. Wiedersheim.

ATTORNEY.

UNITED STATES PATENT OFFICE.

ALGERNON S. KEYSER, OF PHILADELPHIA, PENNSYLVANIA.

CLOCK ATTACHMENT FOR BICYCLES.

SPECIFICATION forming part of Letters Patent No. 477,423, dated June 21, 1892.

Application filed March 14, 1892. Serial No. 424,834. (No model.)

To all whom it may concern:

Be it known that I, ALGERNON S. KEYSER, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Clock and Compass Attachments to Bicycles, &c., which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of an attachment to a bicycle, &c., for supporting a clock or compass, as will be hereinafter set forth.

Figure 1 represents a perspective view of a clock attachment to a bicycle embodying my invention. Fig. 2 represents a perspective view of a modification.

Similar letters of reference indicate corresponding parts in the two figures.

Referring to the drawings, A designates a sleeve, in which the steering-shaft B is mounted.

C designates a block, to which is pivoted a yoke D, whose crown carries the set-screw E. Rising from the block C is a post F, on which is fitted the sleeve G, to which are attached the ears of a knuckle H, the opposite ear whereof is secured to the casing of a clock J, or a compass, (shown in dotted lines,) if so desired. The ears of the knuckle H are connected by a screw K, which also permits the angular adjustment of the clock, and when tightened retains the same in its adjustment. The yoke and block, forming together a sleeve, are placed over the sleeve A and secured thereto by means of the screw E, it being seen that said screw and block are on opposite sides of the same, whereby the block is firmly held on the sleeve and the clock accordingly sustained. It is evident that the clock may be vertically adjusted on the sleeve A by properly moving the block up or down thereon, the screw E being previously loosened and afterward tightened when the adjustment is effected. It is also evident that any other standard of a bicycle or similar vehicle—such as a tricycle, &c.—may be employed to sustain the clock; but the sleeve A is preferred, because the clock may be thereby located in front of the rider.

In Fig. 2 I show a divided sleeve L in lieu of the block C and yoke D, the same encircling the sleeve A, similar to said parts C D. At the rear ends of the sleeve are the ears of the knuckle H, and at the forward ends are ears M, through which is passed the screw N, by which said sleeve L may be clamped upon the sleeve A, said sleeve L permitting the vertical adjustment of the clock or compass, while the knuckle H permits the angular adjustment of the latter, as in the previous case. It will be noticed that the sleeve G is split. Consequently when the screw K is tightened said sleeve is compressed on the post F, thus firmly retaining the clock or compass in its vertical adjustment. When, however, the screw is loosened, the clock may be removed from said post—a feature of importance when the bicycle is not in use.

In referring to a clock I include therein any suitable timepiece.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A clock-support for a bicycle, consisting of a sleeve adapted to embrace the standard of a bicycle, means for holding said sleeve in fixed position, a post on said sleeve, a sleeve fitting on said post, a casing connected by a knuckle-joint with said latter sleeve, and clamping means for securing said latter sleeve and said casing in fixed position, said parts being combined substantially as described.

2. A sleeve adjustable on a bicycle-standard and having a post, a sleeve with ears on said post, a casing with a knuckle-joint connection with said latter sleeve, and a screw for clamping said latter sleeve and joint, said parts being combined substantially as described.

ALGERNON S. KEYSER.

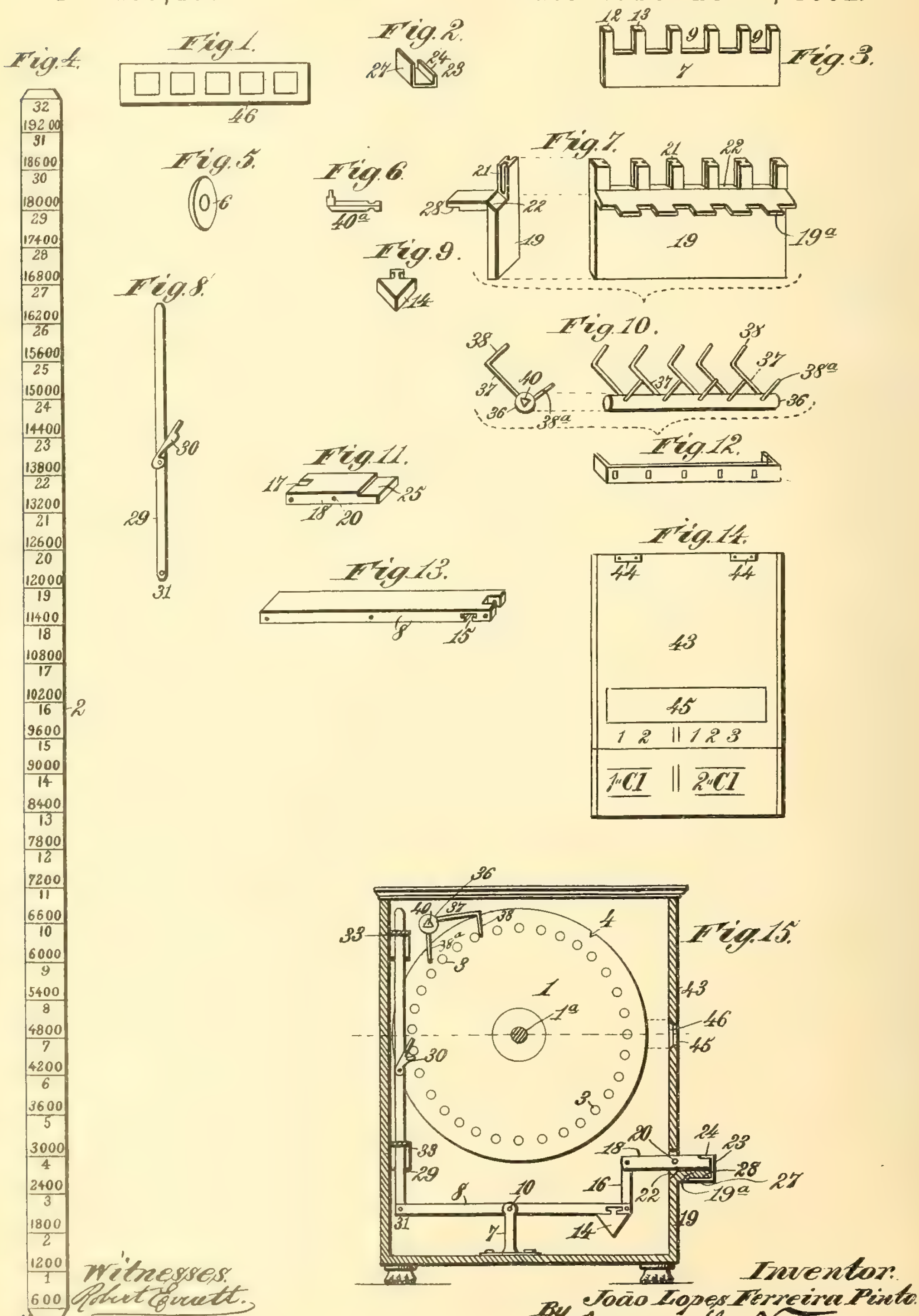
Witnesses:
JOHN A. WIEDERSHEIM,
A. P. JENNINGS.

(No Model.) 2 Sheets—Sheet 1.

J. L. F. PINTO.

WORKMAN'S TIME INDICATOR.

No. 477,448. Patented June 21, 1892.



Witnesses.
Robert Everett.
Geo. W. Rea.

Inventor.
João Lopes Ferreira Pinto.
By James L. Norris. Atty.

(No Model.) 2 Sheets—Sheet 2.

J. L. F. PINTO.

WORKMAN'S TIME INDICATOR.

No. 477,448. Patented June 21, 1892.

Fig. 16.

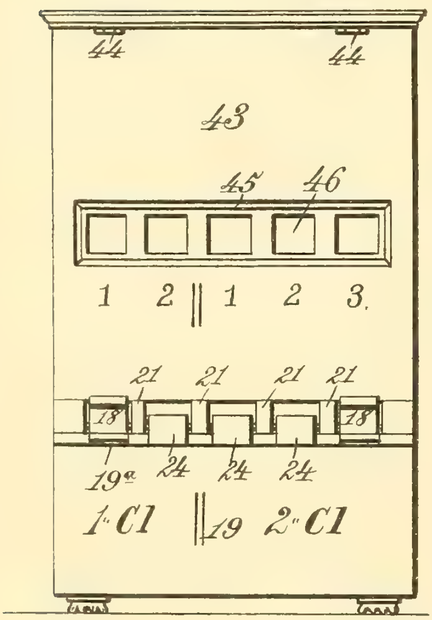


Fig. 17.

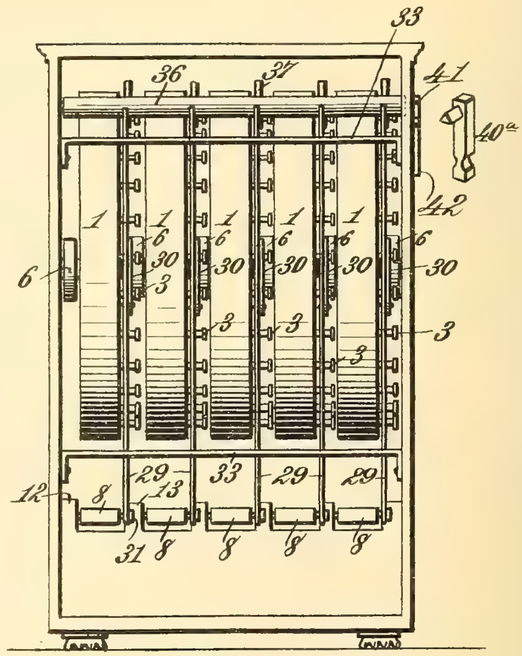


Fig. 18.

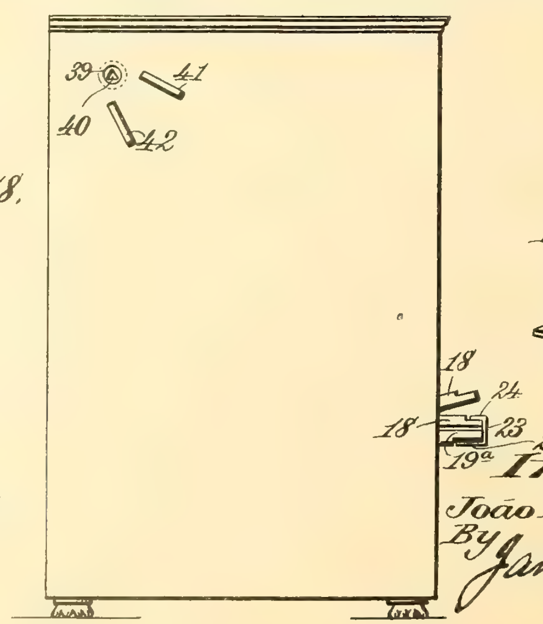
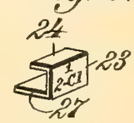


Fig. 19.



Witnesses.
Robert Everett.
Chas. B. Tilden

Inventor:
João L. F. Pinto.
By James L. Norris
Atty.

THE NORRIS PETERS CO., PHOTO-LITHO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOÃO LOPES FERREIRA PINTO, OF RIO DE JANEIRO, BRAZIL.

WORKMAN'S TIME-INDICATOR.

SPECIFICATION forming part of Letters Patent No. 477,448, dated June 21, 1892.

Application filed October 2, 1890. Serial No. 366,845. (No model.) Patented in Brazil July 1, 1890, No. 886.

To all whom it may concern:

Be it known that I, JOÃO LOPES FERREIRA PINTO, a citizen of Brazil, and a resident of Rio de Janeiro, Brazil, have invented certain new and useful Improvements in Automatic Indicating Apparatus, (for which I have obtained a patent in Brazil, dated July 1, 1890, No. 886,) of which the following is a specification.

My invention relates to mechanism for indicating the number of days each workman in a factory or other establishment has been present during the week, fortnight, or month, as the case may be, and also for denoting the total amount of salary or wages due said workman for each day or the aggregate pay for a given number of days of labor.

It is the purpose of my invention to provide an apparatus of this character which shall be automatic in action, which may be adapted to the use of any number of workmen, and be operated by the week, fortnight, or month, as the case may be, its operation depending upon the actual presence and personal act of the employé and being controlled in such manner as to effectually prevent fraud by over indications.

To these ends my invention consists in the novel parts and new combinations of parts hereinafter fully described, and then pointed out definitely in the claims which follow this specification.

To enable others skilled in the art to make, construct, and use my said invention, I will proceed to describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the sight-plate of the apparatus. Fig. 2 is a perspective view of the workman's register-plate. Fig. 3 is a perspective view of the inner supporting-bracket, having a series of bearings for levers. Fig. 4 is a face view, upon an enlarged scale, of one of the ribbons or tapes having a graphical division into substantially equal parts. Fig. 5 is a perspective of one of the washers introduced between adjacent wheels to render their rotation independent one of the other. Fig. 6 is a perspective view of the key of the rock-shaft carrying the devices which limit and arrest the movement of the wheels. Fig. 7 is a perspective view of part of the front wall of the casing, having an outside support provided with a series of bearings for levers. Fig. 8 is a side elevation of one of the movement-transmitters and its movable pawl. Fig. 9 is a detail perspective view of the counter-weight connected to the inside lever. Fig. 10 is a view, partly in perspective and partly in end elevation, of the rock-shaft and the limiting and arresting devices carried thereby. Fig. 11 is a perspective view of one of the levers by which movement is transmitted by the workman to the apparatus. Fig. 12 is a perspective view of one of the guides for the movement-transmitters. Fig. 13 is a perspective view of one of the intermediate levers. Fig. 14 is a face view of the door of the apparatus. Fig. 15 is a vertical section of the apparatus from front to rear. Fig. 16 is a front elevation of the apparatus. Fig. 17 is a rear elevation of the same, the rear wall being removed and the tapes being taken from the wheels, and one of the same shown in face elevation extended in Fig. 4. Fig. 18 is a view of the side wall of the casing, showing the key-opening and the limiting-stops for the key. Fig. 19 is a detail perspective view of the workman's register-plate, having identifying-marks thereon.

In the said drawings, Figs. 1 to 14, inclusive, represent the parts composing an indicating apparatus adapted for five workmen and capable of showing the daily work of each for thirty-one days of work, or a full month, together with the respective salaries paid and the aggregate amounts due each day as the month passes. The dimensions of the apparatus may be even less, if it is required, to give indications for a fortnight or for a week.

The mechanical operation is always the same, without regard to the difference in size of the parts, the alteration in the dimension relating only to the diameter of the wheel 1, (shown in Fig. 15,) since this diameter controls the extent of the circumference, which should always be equal to the length of the ribbon shown in Fig. 4.

In the accompanying drawings, the reference-numeral 1 indicates each one of a series of wheels of suitable size, each of which is provided upon one side near its edge with a series of thirty-two teeth in the form of pins 3, having flat heads, the wheel being provided

with a notch 4, in which the extremities 5 of the ribbon are neatly fastened. This ribbon 2 is divided into thirty-two equal parts, and in the rectangular divisions thus formed are imprinted consecutively the numerals "1" to "31" to denote the days of a month. The thirty-second space of the ribbon is merely a blank or zero space, which forms a point of departure in reckoning. In the first space containing the numeral "1" is printed a figure or figures denoting the daily salary paid to the employé, whose time is indicated by the figures arranged in consecutive order on said ribbon, and in the succeeding spaces are printed figures indicating the aggregate of salary falling due from day to day. For example, if it be supposed that the daily pay of an employé is six dollars per diem, then the numerals "6.00" will appear in the space containing the numeral "1," denoting the first day of the month. In the next succeeding space will appear the numeral "2," indicating the second day of the month or the second of work, together with the figures "12.00," to denote the amount due for two days' work, and so on. The two series of numerals may be distinguished from each other by printing the two series in different colors, the day's work being marked in a color different from that which represents the amount of salary, the latter being preferably black. The wheel 1 or a series of similar wheels, with ribbons attached to their peripheries and marked in the manner described, the salaries being equal to or different from each other, turn upon a common axis or rigid shaft 1^a, fixed at its two ends in the frame of the apparatus. The wheels are separated from each other by washers 6, rendering their rotation entirely independent of one another, this movement being communicated in the manner following:

The inner supporting-bracket 7 (shown in Fig. 3) is attached to the floor of the apparatus, as shown in Fig. 15, and the intermediate levers 8 (shown in Fig. 15) rest upon it in notches 9, being fulcrumed upon pins 10, which have bearing upon the parts 12 and 13, which rise from the bracket 7, as shown in Fig. 3. To each of the levers 8 is attached a counterpoise 14, (shown in Fig. 9,) the head of which lies in a notch 15, formed in the lower face of each lever 8 at or near its front end, as shown in Figs. 13 and 15. The front ends of said levers are connected by links 16 to the ends of a series of exterior levers 18, each of which is provided for such purpose with the notch 17, as shown in Fig. 11. These outside levers 18 rest upon an external support 19. (Shown in Figs. 7, 15, and 16.) The external support is provided with the horizontal outwardly-projecting stops 19^a, referred to below. The levers 18 are provided with fulcrum-pins 20, which rest in slots in the inner faces of the parts 21, formed in the supports 19, which form the bearings or points of support. Said support 19 is chamfered at the points 22 to permit the exterior levers to be easily inclined. (See Fig. 7.)

The reference-numeral 23 denotes what may be termed the "workman's register-plate." (Shown in Figs. 2 and 19.) This plate, which consists of a flat strip of metal having one edge bent at right angles thereto to form a narrow flange 24 and the other end bent in similar manner to form a more extended flange 27, is inserted with its flanged end 24 in the notch or rabbet 25 (see Fig. 11) in the upper face of the end of the exterior lever 18, as shown in Figs. 15 and 18, and its flange 27 is fitted in a seat 28 in a series of stops 19^a, which project horizontally outward from the external support 19 and lie directly beneath the outside levers 18 in such a manner that when the register-plate 23 is once in its place the two levers 8 and 18 are maintained each in its own place in a horizontal position. When the workmen return daily to their work, each will remove the register-plate 23 which belongs to him and which is indicated by the register-number marked upon it, whereupon the released lever 18, actuated by gravity by reason of the counter-weights 14, will assume an inclined position, its outer end being raised, one of said levers being so shown in Fig. 18. It is this latter movement which gives rotation to the wheel 1 through a transmitter 29, Figs. 8 and 15, having a movable pawl 30, pivotally connected to the said transmitter. The pawl 30 is provided with a notch or angular seat, and the pawl is so located that this notch is adapted to engage one of the lateral teeth 3 of the wheel 1, and as the transmitter 29 and pawl 30 rise cause said wheel to advance a single step or so far as is necessary to bring into view the next succeeding space upon the ribbon 2. When leaving the factory, each workman replaces his registry-plate 23 in its place in the apparatus, thereby causing the transmitter shown in Figs. 8 and 15 to descend without moving the wheel, the pawl 30 thereon falling in such a manner that it engages the tooth or pin 3 immediately beneath that one upon the wheel with which it previously had operative engagement in readiness for a repetition of the movement upon the next removal of the registry-plate. The transmitter carrying the pawl is maintained in position and allowed to move by two guides 33, (shown in Figs. 12 and 15,) attached to the frame in such a manner that the said transmitter may move in the rectangular opening in the two guides 33.

In order that the wheel may move only a single step each day and to avoid fraud, I have placed upon the upper and rearward part of the apparatus, nearly in the plane of the transmitters, a rock-shaft 36, (shown in detail in Fig. 10,) said rock-shaft being furnished with limiting or arresting-arms 37, corresponding in number with the wheels 1 and arranged to lie beside the latter and over the pins 3. Upon the ends of these arms are formed short pins 38, standing at or about a

right angle with said arms and extending downward toward the pins 3. On the lower side of the rock-shaft are formed or mounted short points 38^a, which hang almost perpendicularly, as shown in Figs. 10 and 15.

In the drawings the positions of the arms 37, pins 38, and arms 38^a are shown in the position they occupy when the workman has removed the registering-plate and the wheel has been moved to give him credit for work for a day or other period. When the arms are in this position, the wheel cannot be turned further by the workman until the employer, manager, or other person having possession of the key hereinafter referred to has adjusted the arms. In the side wall of the apparatus (see Fig. 18) an orifice 39 is formed substantially in line with the axis of the rock-shaft 36 and registering with an opening 40 in the end of said shaft. Into this opening the triangular portion of a key 40^a may be inserted and caused to describe a limited arc of movement between the stops 41 and 42, Figs. 17 and 18. When this key is turned in the proper direction, the short pins 38 of the arms 37 are raised out of the path of the pins 3 and at the same time the arms 38^a are swung in the arc of a circle and push the pins 3 with which they are in contact a very short distance, equal to the diameter of the pins 3. The key is then turned in the opposite direction, swinging the arms 38^a out of the path of the pins 3 and throwing the short pins 38 of the arms 37 down into the path of said pins 3, when it will be found that the said pins 38 will be upon the side of the pins 3 opposite that which they occupy in the drawings. The wheels 1 are then capable of being moved to indicate another period of labor upon the removal of their respective workman's register-plates. It is designed that only the employer or his manager shall have possession of the key 40^a, thus affording a prevention against fraud.

There is in front of the apparatus a door 43 opening upon hinges 44 and having a large rectangular opening 45, in which is placed the sight-plate 46, shown in Figs. 1 and 16. This door may be opened for substituting new ribbons when there is a change in salaries, and with the external support 19 it completes the outer face or front wall of the apparatus and upon its upper part it may bear the name of the factory. In order that the workmen may know the tape upon which their wages is indicated any suitable system may be adopted—as, for example, the workmen may be divided into classes, and each workman have applied to him a particular number in that class. In using such classification it would be convenient to apportion a certain number of wheels and levers to each class, the wheels and levers for each class being suitably indicated, as in the drawings where the casing is marked off for two classes, as "1st Cl." for class one and "2d Cl." for class two, and each lever in each class would have a suitable designation, as "1," "2," "3," &c. The workmen in each class would, as stated, be given a number in his class, as "No. 1," "No. 2," &c. It will readily be seen that in this manner mistake upon the part of the workmen would rarely occur. Workman No. 1 in class 2 would know that the lever to which the register-plate bearing the mark illustrated by Fig. 19 is attached operates the wheel which accounts his wages, and he would take it from and return it to lever No. 1 in class 2. It is obvious that other systems could be adopted.

In case it is desired to indicate fractions of days with a corresponding salary it will be necessary to increase the number of teeth in the wheel with pins and to graduate the ribbon in a manner proportioned thereto.

When it is required to indicate the fractions of a day less than half a day, it will be found convenient to apply to the cylinder a small clock-movement to render the operation automatic.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. An automatic indicator for industrial establishments adapted to show with precision the number of days of work and the salary corresponding thereto, the same consisting of a wheel having laterally-projecting pins and provided upon its periphery with a ribbon divided into spaces containing figures indicating the days of successive work and the increase or aggregate of salary due each successive day of work, a transmitter carrying a pawl engaging said pins, an intermediate lever connected with the transmitter and having a counterpoise or weight, an exterior lever connected to the weighted end of the interior lever, and a double-flanged register-plate connecting the outer end of the exterior lever with a rigid stop beneath the same, substantially as described.

2. In an automatic indicator, such as that hereinbefore described, the combination, with a wheel indicating the days of work in succession and the aggregate of salary due each successive day of work, of means for giving intermittent movement to said wheel, an exterior lever to impart such movement, a workman's registry-plate adapted to be removed at the beginning of work and replaced at discontinuance thereof, said plate consisting of two parallel flanges, connected by a face-plate, said plate being adapted to maintain the exterior lever and the operating devices in readiness for operative movement, and when removed to release the exterior or operating lever of the device, substantially as described.

3. In an automatic indicator, the combination, with a series of intermediate levers having weights at their ends, of a series of pawl-carrying transmitters, a corresponding series of wheels, upon the flat faces of which on one

side are arranged pins, with which the pawls of the transmitters are adapted to engage, each wheel being provided on its edge with a ribbon having spaces containing numerals, substantially as described, external levers fulcrumed upon an exterior support having a series of outwardly-projecting stops lying beneath the ends of the exterior levers, which are linked to the weighted ends of the levers, and a corresponding series of registry-plates, each having two parallel unequal flanges, one engaging the end of the external lever and the other the stop beneath it, said flanges being connected by a face-plate, substantially as described.

4. In an automatic indicator of the kind described, the combination, with a wheel having a spaced and printed ribbon upon its edge and provided with a circular series of lateral pins, of means, substantially as described, for intermittingly advancing said wheel, a rock-shaft having an opening in its end to admit the angular end of the key, said shaft being provided with radial arms having depending stops upon their ends adapted to engage the pins on the wheel, and with shorter arms hanging from the lower side of said rock-shaft, a pawl-carrying transmitter, a weighted lever pivoted thereto, a second lever connected to one end of the first and having its power end outside a casing inclosing the parts above a rigid stop, and a register-plate provided with flanges at its ends to engage said stop and lever, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOÃO LOPES FERREIRA PINTO.

Witnesses:
JULES GIRAUD,
A. BAILLY.

(No Model.)

G. E. HOLLIS.

CLOCK HAND REMOVER.

No. 478,009. Patented June 28, 1892.

Fig. 1.

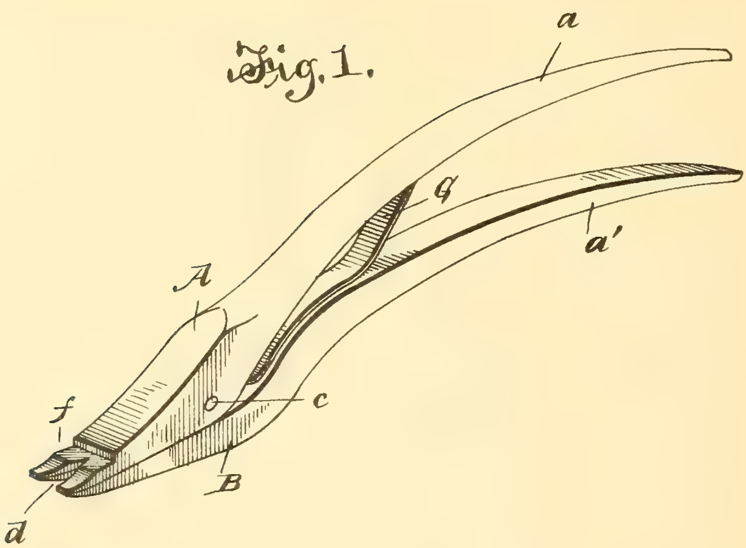
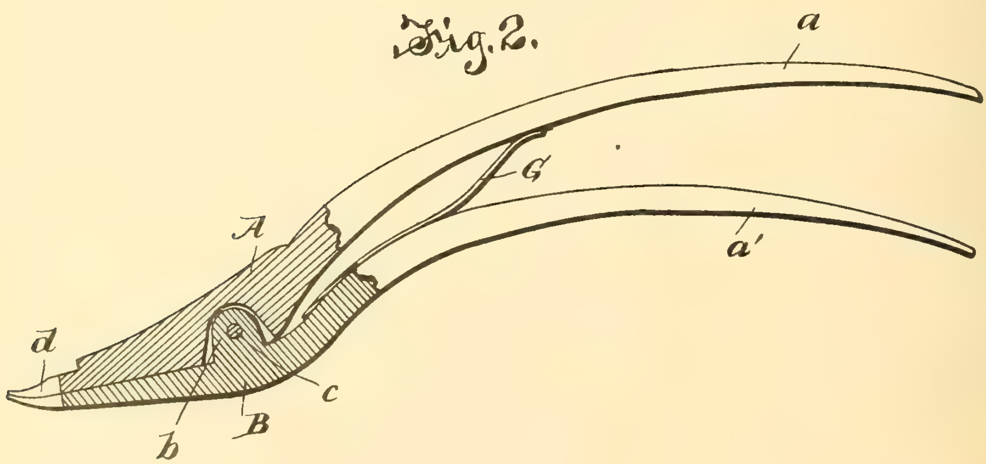


Fig. 2.



Witnesses

Samuel Ker.

Philip C. Masi.

Inventor

Guy E. Hollis.

by E. W. Anderson

his Attorney

UNITED STATES PATENT OFFICE.

GUY E. HOLLIS, OF BENTON HARBOR, MICHIGAN.

CLOCK-HAND REMOVER.

SPECIFICATION forming part of Letters Patent No. 478,009, dated June 28, 1892.

Application filed August 24, 1891. Serial No. 403,623. (No model.)

To all whom it may concern:

Be it known that I, GUY E. HOLLIS, a citizen of the United States, and a resident of Benton Harbor, in the county of Berrien and State of Michigan, have invented certain new and useful Improvements in Clock-Hand Removers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a perspective view, and Fig. 2 is a vertical longitudinal section.

This invention has relation to tools for removing hands from clocks, the object being to provide a tool of this character by the use of which the clock-hands may be readily and quickly removed without injury thereto or to the clock; and the invention consists in the novel construction and combination of parts, as hereinafter described, and pointed out in the claim.

In the accompanying drawings, the letter A designates the upper jaw, and B the lower jaw, each of which is provided with the curved handle extensions *a a*. The upper surface of the lower jaw is provided with a perforated lug or projection *b*, which loosely engages a socket or seat formed in the under side of the upper jaw. A pin *c*, passing through perforations in the side walls of and intersecting this slot and also engaging the perforation of lug *b*, forms a pivotal connection between the jaws. At their forward ends the upper and lower jaws are provided with the coincident V-shaped recesses or slots *d*, forming the claws of the tool. The points of these claws on both jaws are slightly turned up. The upper jaw on its upper surface near its upper end is reduced in thickness, as shown at *f*. Between the handle portions *a a'* is interposed a spring G.

In operation the device is applied to a clock-dial with the lower jaw bearing thereon, the V-shaped coincident recesses in the claws engaging the post or stem. The handles of the jaws are then pressed toward each other, causing the claws to open or move away from each other, and consequently forcing the hands from their seats. In this manner a firm easy action is obtained as the lower claw takes a bearing on the dial, while the upper claw bears against the hand, the spring G which normally holds the claws together being compressed and serving to prevent any sudden movement or jerk which would be likely to injure the face or hands or strain the post.

Having thus described this invention, what I claim as new, and desire to secure by Letters Patent, is—

In a watchmaker's tool, the combination, with a lower member or jaw having a lug or projection on its upper face, of an upper member or jaw having a socket in its lower face pivotally engaged by said lug or projection, a pivot-pin extending through said lug or projection and through the socket and forming a connection between said members or jaws, whereby when their handle portions are brought together their claw portions are spread, coincident V-shaped recesses in the forward ends of said jaws, and a spring seated between said members at the rear of their pivotal connection, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

GUY E. HOLLIS.

Witnesses:

CHAS. FOSTER,

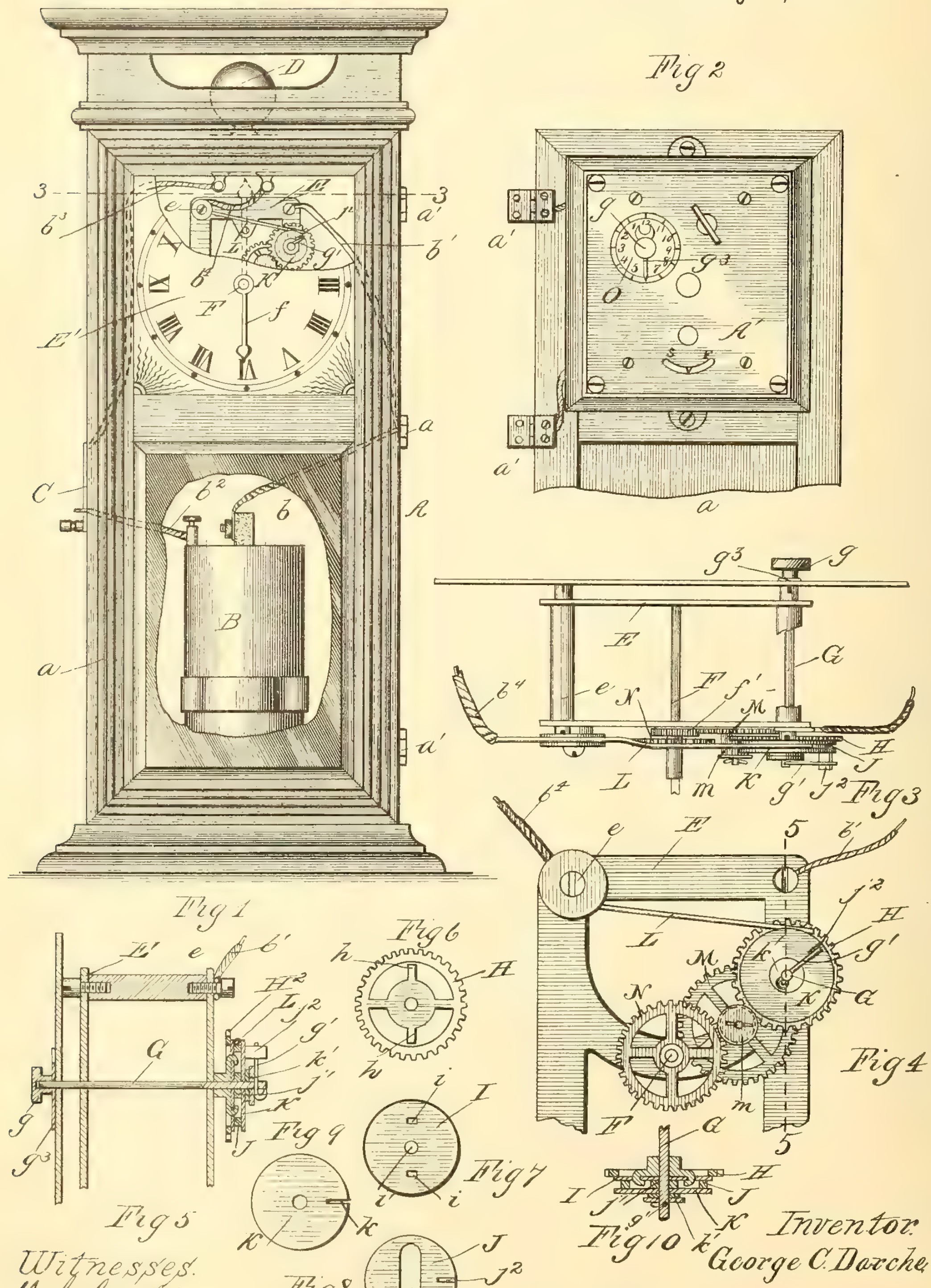
FRED. CALLESTER.

(No Model.) 2 Sheets—Sheet 1.

G. C. DARCHE.

ELECTRIC ALARM CLOCK.

No. 478,155. Patented July 5, 1892.



Witnesses.
W. C. Corlies
J. L. Tunison

Inventor.
George C. Darche
By Coburn & Thacher
Attys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

G. C. DARCHE.

ELECTRIC ALARM CLOCK.

No. 478,155. Patented July

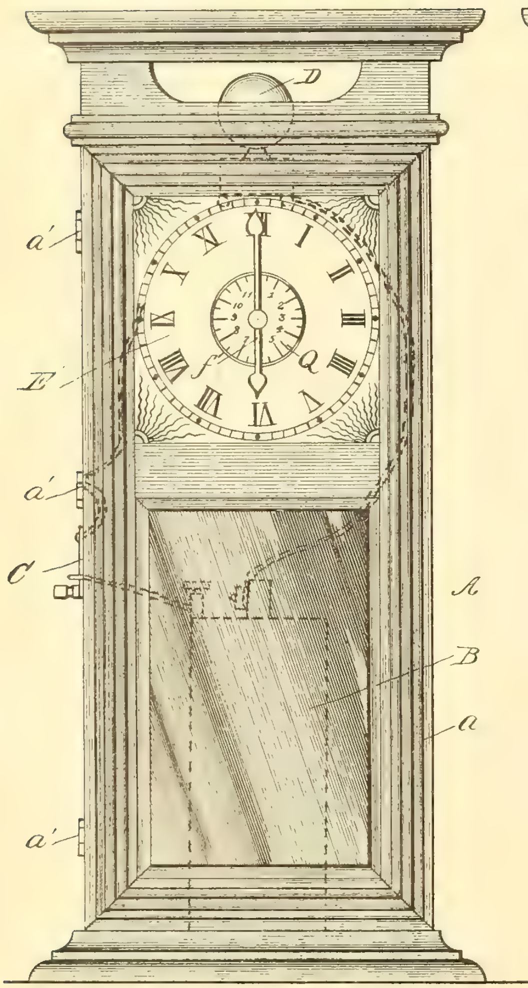


Fig 11

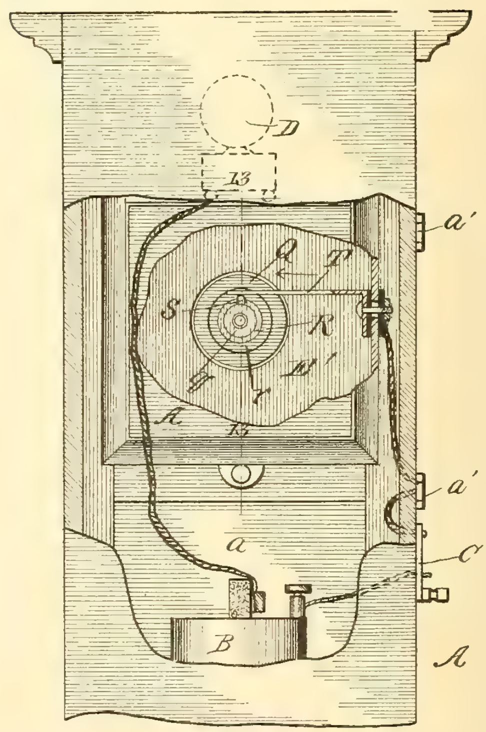


Fig 12

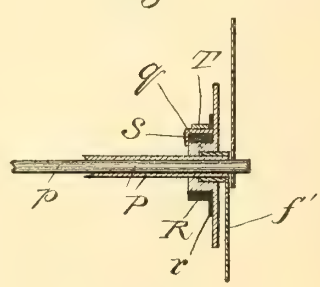


Fig 13

Witnesses
W. C. Corlies
J. L. Vinson

Inventor
George C Darche
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Attys.

UNITED STATES PATENT OFFICE.

GEORGE C. DARCHE, OF CHICAGO, ILLINOIS.

ELECTRIC ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 478,155, dated July 5, 1892.

Application filed June 1, 1891. Serial No. 394,626. (No model.)

To all whom it may concern:

Be it known that I, GEORGE C. DARCHE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electric Alarm-Clocks, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front elevation of a clock embodying my improvements with parts broken away; Fig. 2, a rear elevation of the upper portion of the door at the front of the clock; Fig. 3, a detail plan section taken on the line 3 3 of Fig. 1; Fig. 4, a front elevation of Fig. 3; Fig. 5, a detail section taken on the line 5 5 of Fig. 4; Fig. 6, a front elevation of the contact gear-wheel detached; Fig. 7, a similar view of the vulcanized disk applied to the front of said wheel; Fig. 8, a similar view of a second disk applied to the front of the disk, Fig. 7; Fig. 9, a similar view of the outside or carrying disk applied to the former; Fig. 10, a plan section of said wheel and disk attached; Fig. 11, a front elevation of a clock embodying my invention in a modified form for an eight-day clock; Fig. 12, a rear elevation of the upper part of the door in Fig. 11; and Fig. 13, a detail vertical section taken on the line 13 13 of Fig. 12, looking in the direction of the arrow.

My invention relates to electrical alarm-clocks—that is, clocks in which the alarm is operated by an electrical current obtained by the closing of the circuit with the battery at any selected moment by means of devices operated by the ordinary clock-work, these devices being of course adjustable, so as to accurately fix the time at which the alarm shall be sounded. My improvements relate to these controllable and adjustable devices for closing the circuit in connection with an alarm device which is thus put in operation, and I will proceed to describe in detail the construction and operation of a clock mechanism in which I have embodied my invention in one practical way, and will then point out more definitely in claims the particular improvements which I believe to be new and wish to secure by Letters Patent.

Most parts of the clock are of known ordinary construction and will not be described, except so far as may be necessary for an understanding of the operation of my improvements.

In the drawings, A represents the clock-case, the front of which is closed by a door a, hung on hinges a'. The clock-work is arranged in the upper part of the case, while in the lower part is closed a battery B. At one side of the case is an electric switch C, and a bell or other alarm device D is arranged at the top of the clock over the works. The frame E for the clock-works is covered by the usual dial-plate E'.

In the construction shown in Fig. 1 and the figures pertaining thereto one pole of the battery is connected by a wire b to one of the hinges of the door, which is in turn connected by wire b' with the frame of the works. The other pole of the battery is connected by wire b^2 with the switch, from which a wire b^3 also leads to the alarm. The alarm is also connected by another wire b^4 to the frame E, the attachment to the latter, however, being made to a post e, which is insulated from the frame. The hour-hand shaft F is mounted in the clock-works frame, as usual, and projects therefrom at the front to receive the hour-hand f. The circuit is closed by devices on the hour-hand shaft or on a shaft or wheel driven by this shaft, so as to move in harmony therewith. The latter arrangement is the one illustrated by Figs. 1 to 10, which I will now describe.

A shaft G is mounted in the clock-work frame at one side thereof and, as shown in the drawings, a little higher than the hour-shaft. This shaft is normally stationary, but is not fixed. It may be turned in its bearings by means of a small head g on its rear end at the back of the clock, through which it projects. The shaft is held by friction in its bearings, however, so as not to be turned easily. A pin g' is fastened to the front end of this shaft, which projects out beyond the front of the frame E, the pin being arranged radially or at right angles to the shaft. On this shaft, in front of the frame, there is also mounted loosely a gear-wheel H, which carries the traveling contact, and so may be called the "contact-wheel." Immediately in front of this gear-wheel there is a thin disk I, of vulcanized fiber or any other suitable non-conduct-

ing material. This disk is fastened to the wheel by providing it with two small apertures i, arranged in line with the central opening i' for the shaft. Two of the spokes h of the wheel H are severed at their outer ends, as seen in Fig. 6, and these ends are bent out, passed through the slots in the disk I, and then turned down so as to secure the latter to the wheel, as seen in Fig. 10.

A metal disk J is applied in front of the disk I. This disk constitutes the contact device, which is connected with the post e. It must, therefore, be insulated from the shaft. To accomplish this the disk is provided with a long wide slot j, extending almost across it, which is so much wider than the diameter of the shaft that when applied to the latter there is provision for a washer j', of non-conducting material, which sets within the slot, as seen in Fig. 5. The projecting bent ends of the wheel-spokes will be received in the slot between the outer ends thereof and the washer, and so all contact with these metallic points will be obviated, as seen in Fig. 5. On the outer face of this disk there is a short metal point or projection j^2, arranged at the edge of the disk and standing out directly therefrom. This may be a thin piece of platinum or any other metal suitable for making contact.

Immediately in front of the metal disk J there is applied another insulating-disk K, which may be of the material already mentioned for the disk I or any other suitable material. This disk is provided at one edge with a short radial slot k, which receives the contact-point j^2, that must project out beyond the disk for the purpose of making contact on the outside thereof. On the outside of the disk K are suitable washers k', and these parts are all held together and upon the shaft by any suitable device. In the drawings this device is the pin itself g', which, as here shown, acts as a kind of linchpin. It will be seen from this description that the metal disk J is entirely insulated from the shaft or any of the metallic parts connected therewith, except when the contact-point j' is brought into contact with the pin g'. The pin is projected outward radially, so as to extend in the path of this contact-point as it is revolved with the wheel, the point itself acting as a kind of wiper to make and retain contact with the pin as it passes by it.

Connection between the metallic disk I and the post e is obtained by means of a short elastic wire L, which is fastened at one end to the post, while its other end is left free and is brought to rest upon the top of the disk and is held under sufficient tension to always preserve this contact. The two insulating-disks I and K are preferably a little larger than the metal disk J, so as to project somewhat beyond the latter to permit this wire to lie between them, thereby keeping it in place on the disk, as seen in Fig. 5 of the drawings. Obviously when the switch is adjusted to make connection between the battery and the alarm the circuit will be closed whenever the metallic wiper on the contact-wheel is brought into contact with the pin on the shaft G, and of course the alarm will be sounded as long as such contact continues. The contact-wheel is rotated from the hour-hand shaft by any suitable gearing which will make the movement synchronous with that of the shaft or hour-hand. As shown in the drawings, this is accomplished by gearing directly with the hour-hand movement, which is of the ordinary construction, consisting of a pinion f' on the shaft F engaging with a gear-wheel M, which also has a pinion m engaging with the usual hour-hand wheel N, mounted loosely on the shaft F and carrying the hour-wheel in the customary way. The gear-wheel H is arranged to engage directly with the pinion m and be rotated thereby, and the wheel is made of the same size as the hour-hand wheel, so that its movement will be synchronous therewith. The alarm is set for any desired hour by turning the shaft G so as to set the contact-pin at the proper point, and this is done, as already stated, by means of a head on the back end of the shaft, where there is also provided an ordinary setting-indicator O, fastened on the back of the casing A', which is secured to the back of the door, as usual, the shaft being provided with an index-finger g^3, by which it is set. By means of the switch it is obvious that the circuit may be broken and kept open, as may be desired.

In Figs. 11 to 13 a slight modification in construction and arrangement is shown, adapted to clocks of larger size, where a central indicator arranged in the center of the dial-plate may be employed. In this modification the hour-hand is on a tubular shaft P, which is sleeved on the minute-hand shaft p. On the hour-hand shaft is placed a common indicating-disk Q, the face of which is graduated, as usual. The center of the dial-plate, being cut away, will show through, as seen in Fig. 11. The disk is provided with a short hub q, extending inward around the sleeve-hub of the hour-hand and the shaft of the latter, as seen in Fig. 13, and free to be turned thereon. On the outside of this hub and surrounding it is a collar R, of non-conducting material, vulcanized fiber, or other suitable material, and preferably this collar is provided with a flange r at the inner edge, which will project outward somewhat along the back of the disk. A metallic point S is secured to the back side of the disk and extended outward over the insulating-collar, and preferably is then bent downward and its outer end soldered again to the hub of the disk, though this downward bend is not an absolute necessity, being designed for security of fastening only. A contact strip or spring T is secured at one end to the clock-case and extends inward until its free end rests directly upon the insulating-collar R.

The battery is connected up with this contact-spring through the switch, as before, and on the other side it is connected up with the disk in any convenient way. In the drawings it is shown as connected first directly to the alarm and thence to the disk, as seen in Fig. 12. Now it is obvious that while the contact-spring rests directly upon the collar of insulating material the circuit is broken and of course the alarm will not sound; but when the contact-point S is brought around by the revolution of the disk to this spring it will pass under the latter, lifting it slightly, make contact therewith, and thereby close the circuit and keeping it closed until it entirely leaves the spring again, during which time it is obvious that the alarm will be sounded. It will be seen that here, as in the former case, the contact-point is carried by a wheel or disk which revolves with the hour-hand shaft and its movement is synchronous with that of the latter. The setting of the alarm is effected by turning the disk until the finger indicating the hour desired for the alarm is brought directly underneath the hour-hand—an ordinary mode of setting an alarm, however.

The construction and arrangement first described are for use on small clocks, where the dial is too small to readily accommodate the setting-disk in its center; but in all instances where the dial is sufficiently large to permit the application of the disk centrally thereof I prefer the second arrangement.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric alarm-clock, the battery and alarm, in combination with the spring L, the contact-wheel H, carrying the insulated terminal j^2, the shaft G, carrying the pin g', and gearing adapted to rotate said contact-wheel synchronously with the hour-hand, substantially as described.

2. In an electric alarm-clock, the shaft G, mounted loosely in its bearings and provided with a pin g' at one end, in combination with the contact-wheel H, mounted loosely on said shaft and carrying an insulated terminal j^2, adapted to make contact with said pin, which constitutes the other terminal of the circuit, gearing adapted to rotate said wheel synchronously with the hour-hand, and an indicator by which to adjust the shaft G to set the alarm, substantially as described.

3. In an electric alarm-clock, the shaft G, provided at one end with the pin g', forming one terminal of the circuit, in combination with a contact-wheel mounted loosely on the pin end of said shaft and consisting of a gear-wheel, the insulating-disks I and K and the metal disk J, provided with the other terminal j^2, and the spring L, arranged to bear upon the periphery of the disk J and connected at its other end with the circuit-wires, substantially as described.

GEORGE C. DARCHE.

Witnesses:
CARRIE FEIGEL,
A. M. BEST.

(No Model.)

B. E. WATERS.

TIME SWITCH FOR ELECTRIC CIRCUITS.

No. 478,180. Patented July 5, 1892.

Fig. 1.

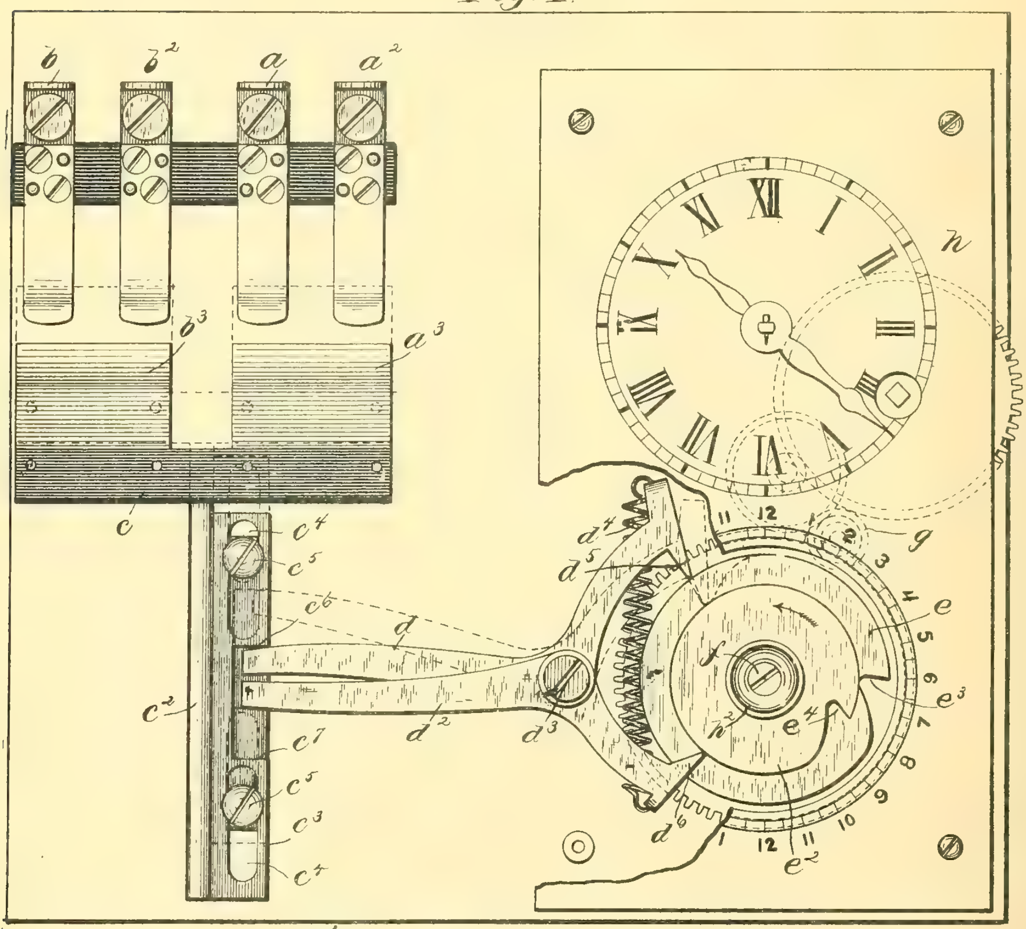


Fig. 2.

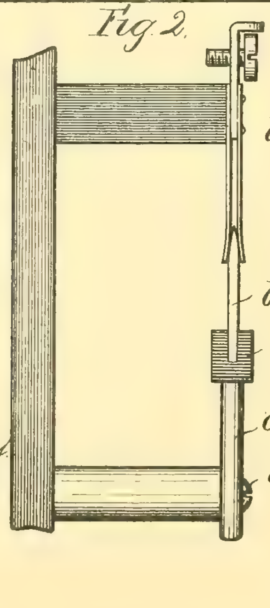
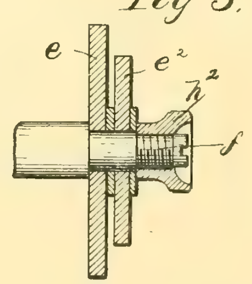


Fig 3.



Witnesses
Jas. J. Maloney
M. E. Hall

Inventor.
Benjamin E. Waters
by Jas. P. Livermore
Att'y

UNITED STATES PATENT OFFICE.

BENJAMIN E. WATERS, OF BROCKTON, MASSACHUSETTS, ASSIGNOR TO THE WATERS ELECTRIC COMPANY, OF SAME PLACE.

TIME-SWITCH FOR ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 478,180, dated July 5, 1892.

Application filed June 13, 1891. Serial No. 395,899. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN E. WATERS, of Brockton, county of Plymouth, State of Massachusetts, have invented an Improvement in Automatic Time-Switches for Electric Circuits, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

My invention relates to an electric switch and mechanism for operating the same automatically at a predetermined hour and minute of the day, the said apparatus being useful, for example, in places where it is desired to throw one or more electric lamps into operation at a certain time and to throw them out of operation at another predetermined time from day to day.

The apparatus comprises a movable contact maker and breaker by which the desired circuit connections are made or severed at the desired time, and two independently-operated actuators, one for moving the said contact-maker in the direction for making a change of one character in the circuit connections—as, for example, to close a circuit connection—and the other for moving said contact-maker in the direction to produce the reverse change—as, for example, to open the electrical connection closed by the previous movement. The said actuators are shown as impelled by the force of a spring to perform each its own operation on the contact-maker, and the operation of said actuators is controlled by cams—one corresponding to each—moved by a clock-work or time-motor, so that the said cams rotate once in twenty-four hours. The actuators engage and move the contact-maker only in the movement of said actuators produced by their spring, and in the return movement by which the actuating-spring is strained preparatory for the next operation no effect is produced upon the contact-maker. The cams are provided with notches or recesses that permit the actuators to move suddenly under the action of their springs when the cam in its movement arrives at the proper position with relation to said cams, which are adjustable with relation to their connection with the actuating time-motor, so that each may release the corresponding contact-actuator at any given time for which it is set.

Figure 1 is a face view of an automatically-operated time electric switch embodying this invention; Fig. 2, a sectional detail view showing the contacts in side elevation, and Fig. 3 a sectional detail showing the connection of the cams with their actuating-shaft.

The specific construction of the contacts and the relation of the circuits controlled by them is immaterial, as the apparatus may be employed to produce changes of any desired character that can be made by moving an electric contact-maker intermittingly. As shown in this instance, the contacts are so arranged as to make and break connection between each terminal of a loop or circuit to be supplied with the current and the corresponding members of the current-supplying circuit or to sever such connections.

The switch proper is shown as comprising a pair of contacts a a^2 and another pair of contacts b b^2, all supported in such manner as to be electrically insulated from one another, each of said contacts comprising a pair of spring-fingers, between which a corresponding wedge-shaped contact-maker a^3 or b^3 may be wedged, so that the said contact-maker a^3 will place the contacts a a^2 in electrical continuity when the said contact-makers a^3 b^3 are wedged between the spring-fingers of said contacts, as shown in Fig. 2. The two portions a^3 b^3 of the contact-maker are carried by a bar c of insulating material, itself supported upon a slide-bar c^2, having a longitudinal movement on suitable guides by which the contacts a^3 b^3 are moved toward and into contact with the contacts a a^2 b b^2 or away from and out of contact therewith. As shown in this instance, the slide-bar c^2 is composed in part of a plate c^3, having slots c^4, moving on the shanks of screws c^5, which thus guide the contact-carrier properly, the said slide-bar also having shoulders c^6 c^7, that co-operate with the actuators d d^2, shown as levers or arms pivoted at d^3 and acted upon by a spring d^4, which tends to separate the ends of the arm d d^2, that lie between the shoulders c^6 c^7—in other words, tending to move the arm

d upward or toward the dotted-line position thereof (shown in Fig. 1) and to move the lever d^2 downward.

The contact-maker a^3 b^3 is shown in Fig. 1 in the position in which it was placed at the last movement downward of the actuator d^2, in which position it will remain until thrown by the actuator d into dotted-line position.

The actuators d d^2 are caused to act alternately and each at the desired hour and minute of the day by the following means: The actuator d has a controlling-finger d^5, that rests upon the surface of a cam e, and the actuator d^2 has a similar controlling-finger d^6, that rests upon the surface of a controlling-cam e^2. The said cams e e^2 are mounted upon a spindle f, connected by gearing (shown in dotted lines g) with a time motor or clock h, the said gearing being such that the spindle f and the cams e e^2 thereon rotate once in twenty-four hours. The position of said cams with relation to the shaft f may be changed, as desired, to make them operate at the proper time, and when properly adjusted they may be clamped or otherwise firmly fastened upon the said shaft, as by the clamping-screw h^2. (See Fig. 3.) The said cams are each composed, mainly, of a circular disk, the periphery of which supports the controlling-fingers d^5 d^6 with the actuator-arms d d^2 in full-line position and the spring d^4 under strain; but each of said disks is provided with a shoulder or notch e^3 e^4, one side of which is about radial and the other inclined from the bottom of the radial portion toward the unnotched part of the periphery.

The operation is as follows: Assuming that the parts are in the position shown in Fig. 1, the cams e e^2 turn slowly in the direction of the arrow, and at a certain time of the day, dependent upon the position at which the cam e is set on the shaft f, the notch e^3 arrives at the controlling-finger d^5 of the actuator d, permitting the said actuator to be thrown suddenly by the spring d^4 into the dotted-line position. At this time the finger d^6 of the other actuator d^2 is still upon the periphery of the cam e^2, and thus remains in its full-line position, so that the actuator d in its sudden spring-impelled movement engages the shoulder c^6 and throws the contact-carrier into position to produce electric connection between contacts a a^2 and between contacts b b^2. Then as the cams e e^2 continue their slow movement the inclined side of the notch in the cam e gradually presses the actuator d back to its full-line position; but inasmuch as the actuator does not engage the contact-maker in this movement the said contact-maker remains in the position in which it was thrown by the actuator d, which may be called the "closed position." Then at a predetermined later time the notch e^4 of the cam e^2 arrives at the finger d^6 of the opening-actuator d^2, which is then moved suddenly by the spring d^4 in the direction to restore the contact-makers to full-line positions, and thus open the circuit between a and a^2 and between b and b^2. Then in the further movement the inclined side of the notch e^4 in the cam e forces the actuator d^2 back to the full-line position without further movement in the contact-maker, which remains in the open position until again operated by the closing-actuator d. Thus the circuit controlled by the instrument is shifted from one to the other condition at the desired moment in the day, and such movements are repeated each day as long as the time-motor is kept running without any care on the part of the attendant.

It is obvious that the details of construction can be varied without departing from the essential features of the invention, it being unnecessary, for example, that the actuators should have a pivotal or rocking movement, and also being unnecessary that both should be operated by the same spring, the essential feature being that the said actuators are moved promptly by a suitable force, their actuating movement being controlled but not produced by the time-motor and the movement of each being independent of the other and capable of independent adjustment as to its time of occurrence.

I claim—

The combination, with the stationary contacts, of the movable contact-maker and its supporting and guiding slide-bar provided with engaging projections or shoulders, and pivoted spring-actuated levers each having one arm arranged to co-operate with one of said shoulders of the slide-bar, and a time-motor and cams operated thereby controlling the other arms of said actuating-levers, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BENJAMIN E. WATERS.

Witnesses:

JOS. P. LIVERMORE,

M. E. HILL.

(No Model.)

L. N. BEDFORD.

TIME LOCK.

No. 478,213. Patented July 5, 1892.

Fig.1.

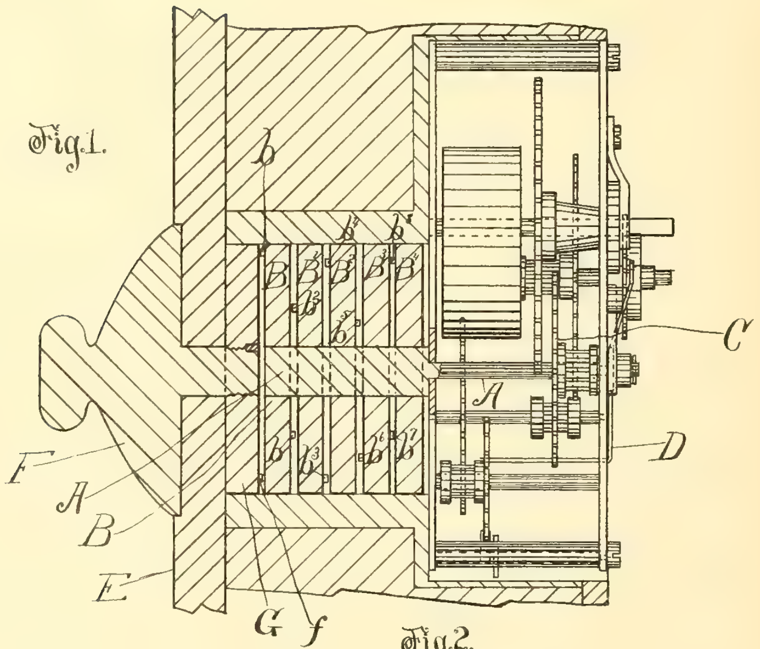
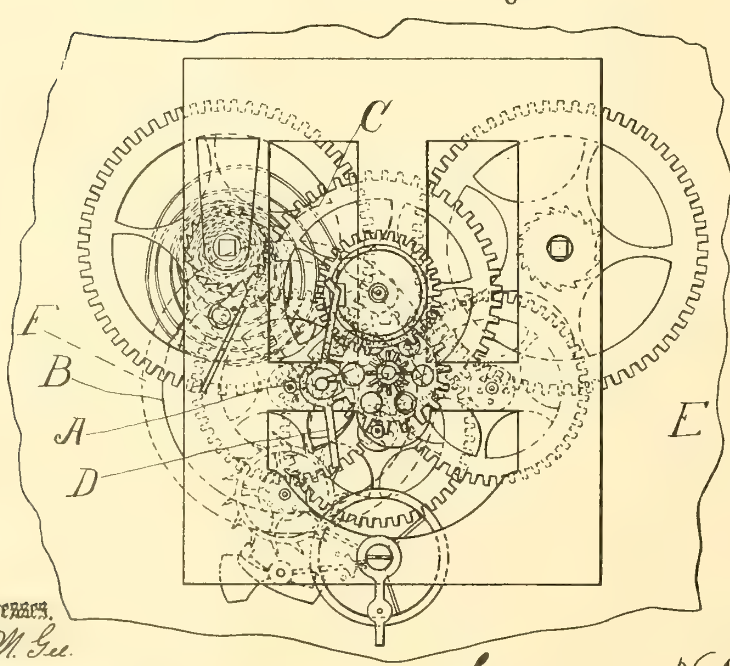


Fig.2.



Witnesses.
M. M. Gee.
F. M. Townsend.

Inventor.
Lyman N Bedford
by Hazard & Townsend
his Attys.

UNITED STATES PATENT OFFICE.

LYMAN N. BEDFORD, OF SAN BERNARDINO, CALIFORNIA.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 478,213, dated July 5, 1892.

Application filed June 18, 1891. Serial No. 396,686. (No model.)

To all whom it may concern:

Be it known that I, LYMAN N. BEDFORD, a citizen of the United States, residing at San Bernardino, in the county of San Bernardino and State of California, have invented a new and useful Improvement in Time-Locks, of which the following is a specification.

My invention relates to that class of time-locks in which the time mechanism is arranged to disarrange the permutation tumblers.

The object of my invention is to increase the efficiency of such locks.

My invention consists of the combination of a rotating arbor, time mechanism arranged to rotate the arbor, and a series of permutation-tumblers journaled upon such arbor and adapted to rotate therewith and to be rotated thereupon.

The accompanying drawings illustrate mechanism for carrying out my invention.

Figure 1 shows a section of a safe-door and a train of tumblers mounted upon a rotating arbor or spindle connected with mechanism for rotating the arbor, which mechanism is shown in plain side elevation. Fig. 2 is a view of the same, looking from the inner side of the door.

No illustration is made of the bolts and other portions of the lock not relating immediately to my invention.

A represents the rotating arbor or spindle upon which the series of tumblers B are journaled.

In Fig. 1 the tumblers are shown in mid cross-section to expose the spindle, which is shown partly in section. The rotating arbor A is connected with a suitable train C of time mechanism arranged to rotate the arbor.

D represents suitable stop mechanism for stopping the rotation of the arbor at the time desired.

E represents a portion of the door in cross-section.

F represents the outside tumbler-operating handle journaled in the door.

G represents the actuating-tumbler fixed to the outside tumbler-operating handle. It is to be understood that this actuating-tumbler is essentially a part of the handle, and that its form as shown is non-essential. It need only to consist of an arm provided with the actuating-pin *f*, which engages the pin *b* on the first tumbler B to move such tumbler when it is desired to adjust the tumblers to allow the bolts to be drawn.

The operation is as follows: The time mechanism is wound and set in operation and the stop mechanism is set to stop the time mechanism or its connection with the arbor, so as to stop the rotation of the arbor at the time desired. This is done from the inside of the safe or other door before such door is closed and the bolts are thrown into place, thus releasing the tumblers and leaving them free to rotate with the arbor. This causes them to be immediately thrown out of their adjustment, so that the bolts cannot again be withdrawn. The arbor A continues to turn until the mechanism operates to stop it. In case an attempt is made to unlock the lock while the spindle is rotating, such rotation causes the displacement of each tumbler as soon as it is adjusted, so that it may be made impossible to unlock the lock even though protected by only two tumblers. When the arbor stops rotating, the person in possession of the combination opens the lock with the same ease as though the lock were unprovided with the time mechanism, and this is the case whether the rotation ceases because of the operation of the stop mechanism or by accidental stoppage of the time mechanism, thus giving absolute security against being locked out by stoppage of the time mechanism.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

The combination of the rotating arbor, time mechanism arranged to rotate the arbor, and a series of tumblers journaled upon such arbor and adapted to rotate therewith and to be rotated thereupon, substantially as described.

L. N. BEDFORD.

Witnesses:
JAMES R. TOWNSEND,
A. D. BEDFORD.

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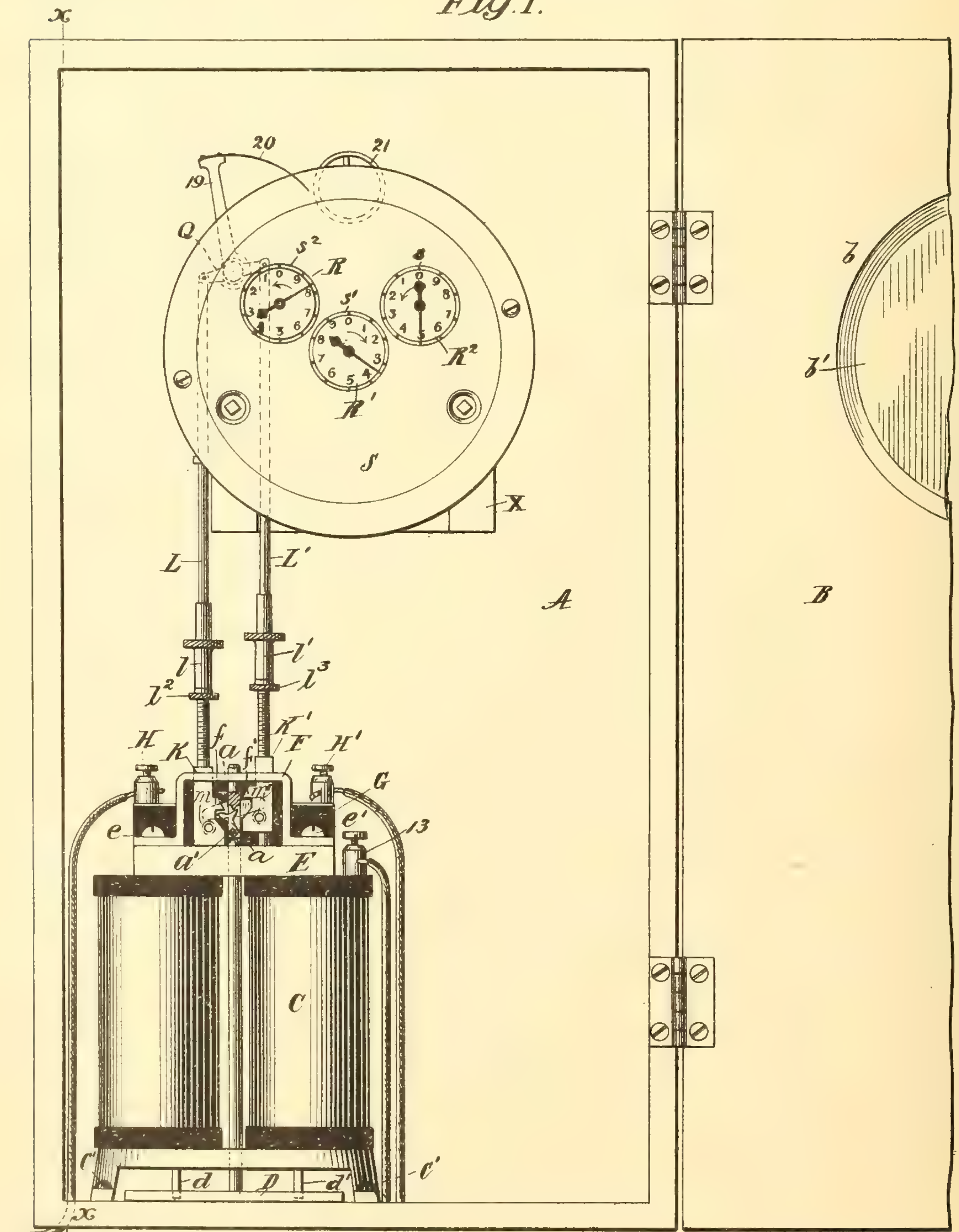
H. H. PATTEE.

TIME REGISTERING APPARATUS FOR ELECTRICITY.

No. 478,237. Patented July 5, 1892.

Fig. 1.



WITNESSES:
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M. Suter.

INVENTOR
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BY
Redding & Kiddle
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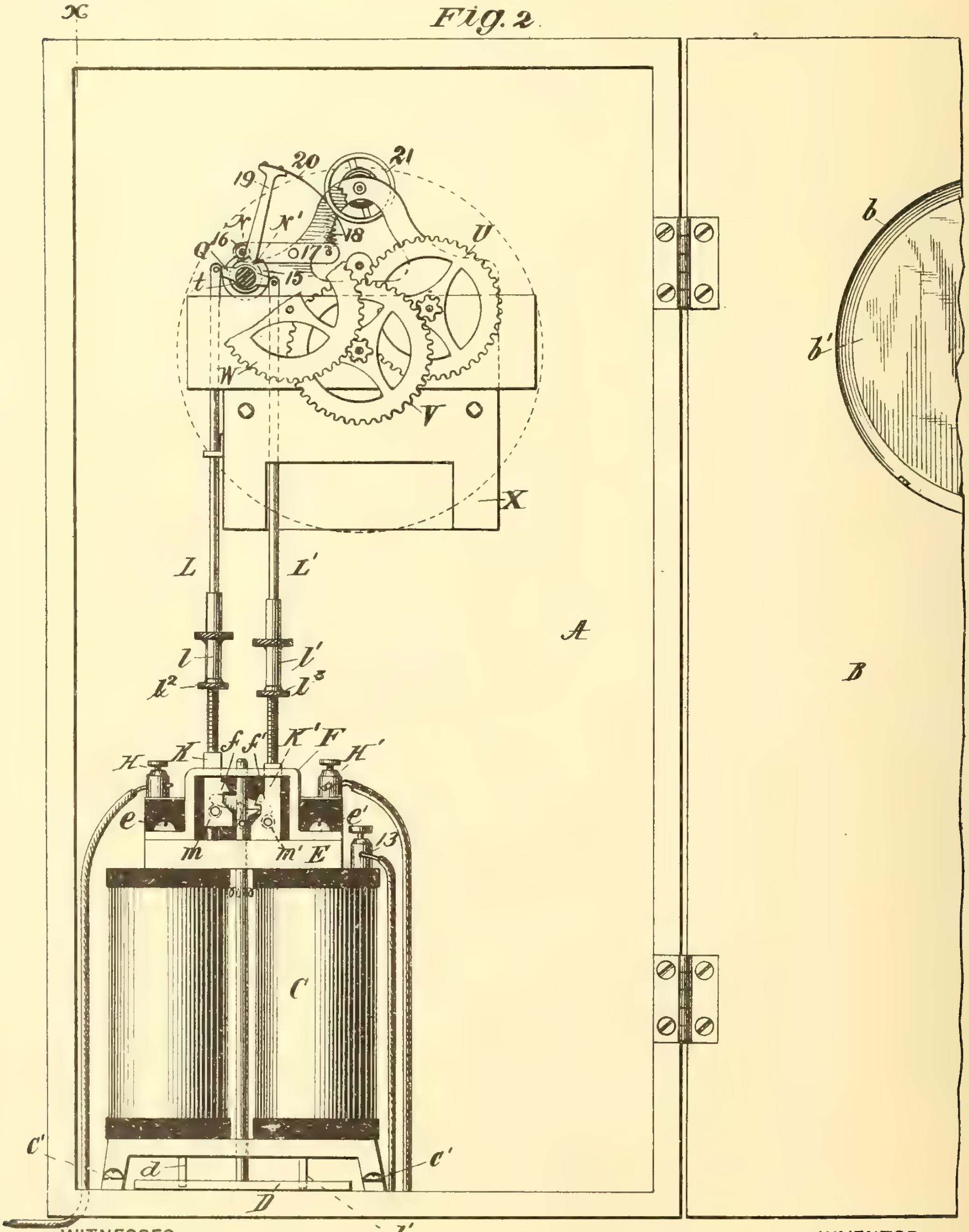
(No Model.) 5 Sheets—Sheet 2.

H. H. PATTEE.

TIME REGISTERING APPARATUS FOR ELECTRICITY.

No. 478,237. Patented July 5, 1892.

Fig. 2.



WITNESSES:

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(No Model.) 5 Sheets—Sheet 3.

H. H. PATTEE.

TIME REGISTERING APPARATUS FOR ELECTRICITY.

No. 478,237. Patented July 5, 1892.

Fig. 3.

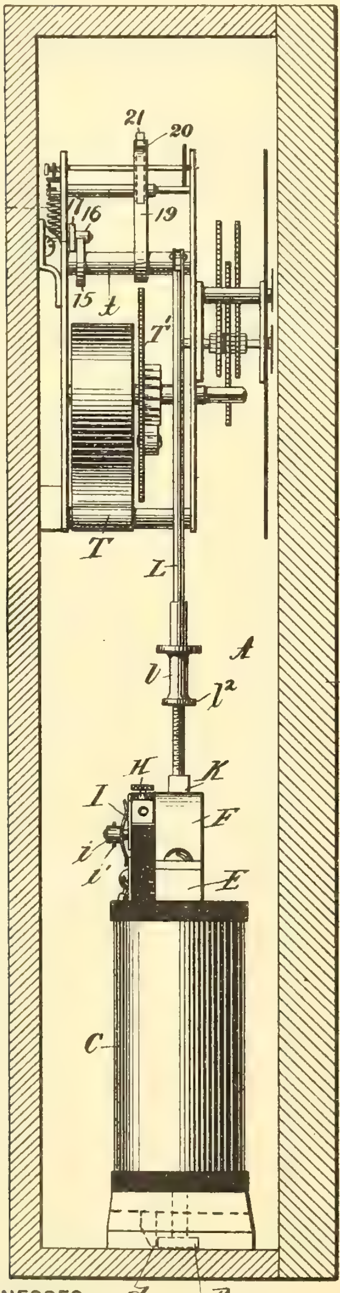


Fig. 4.

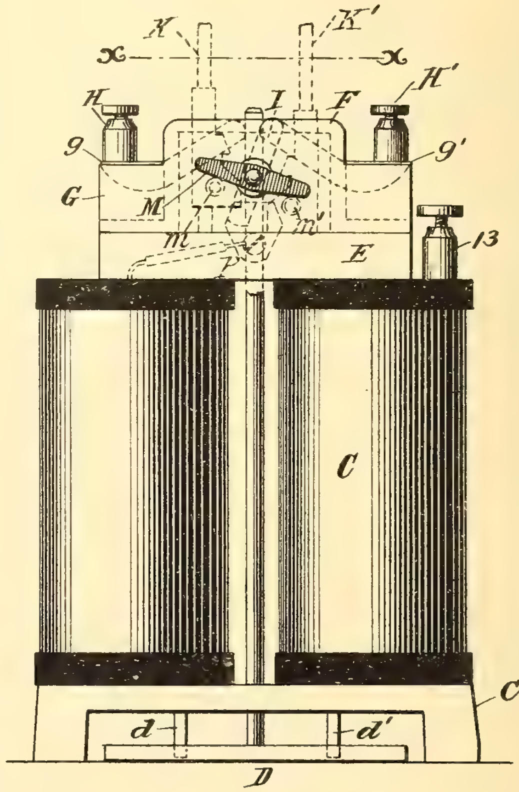


Fig. 5.

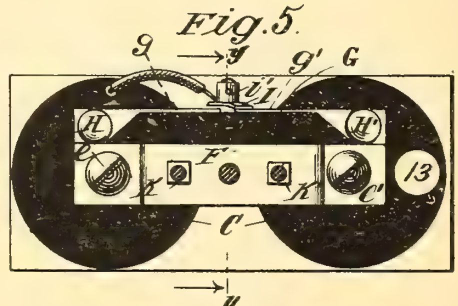
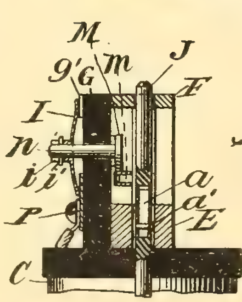


Fig. 6.



WITNESSES:
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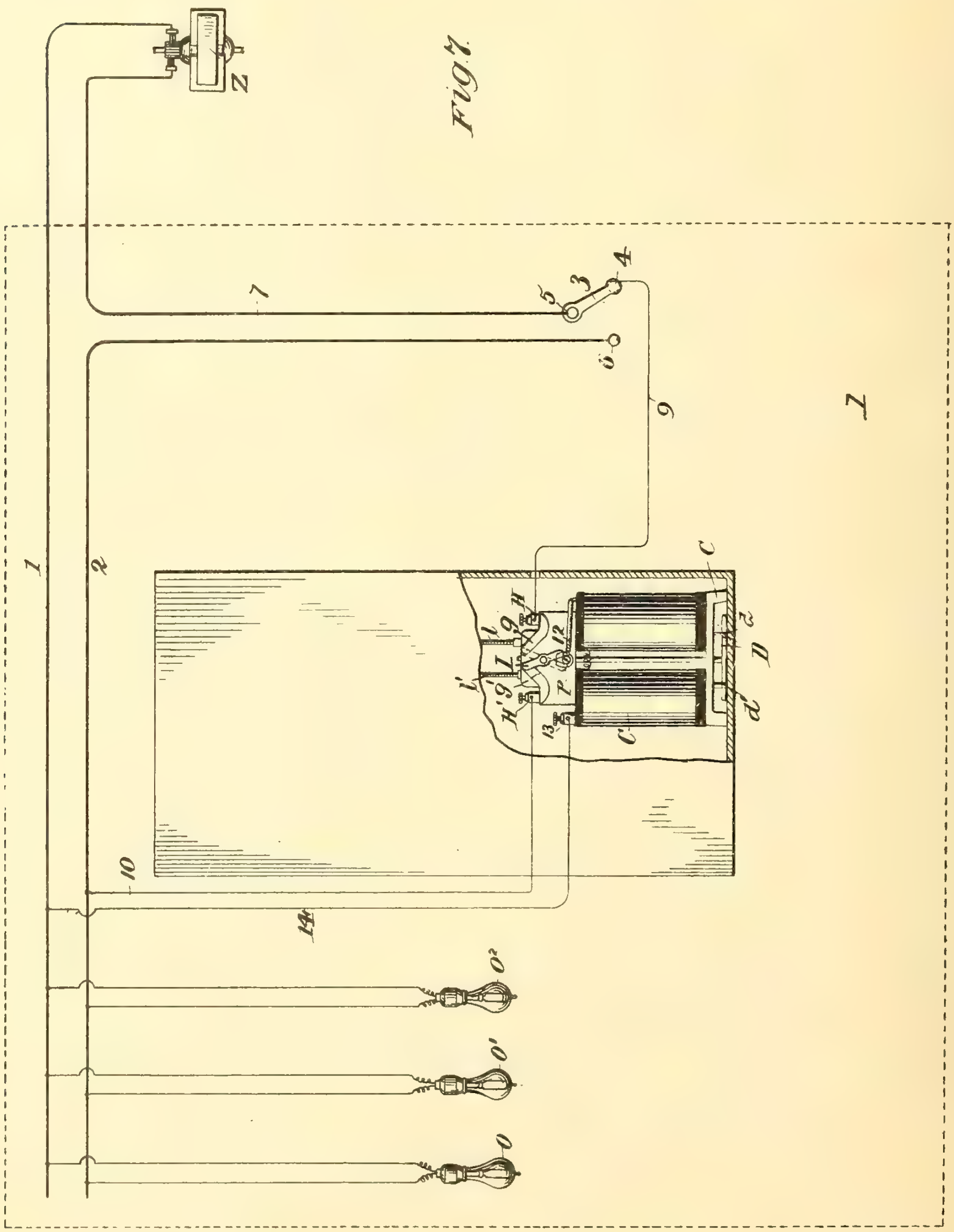
(No Model.) 5 Sheets—Sheet 4.

H. H. PATTEE.

TIME REGISTERING APPARATUS FOR ELECTRICITY.

No. 478,237. Patented July 5, 1892.



WITNESSES:

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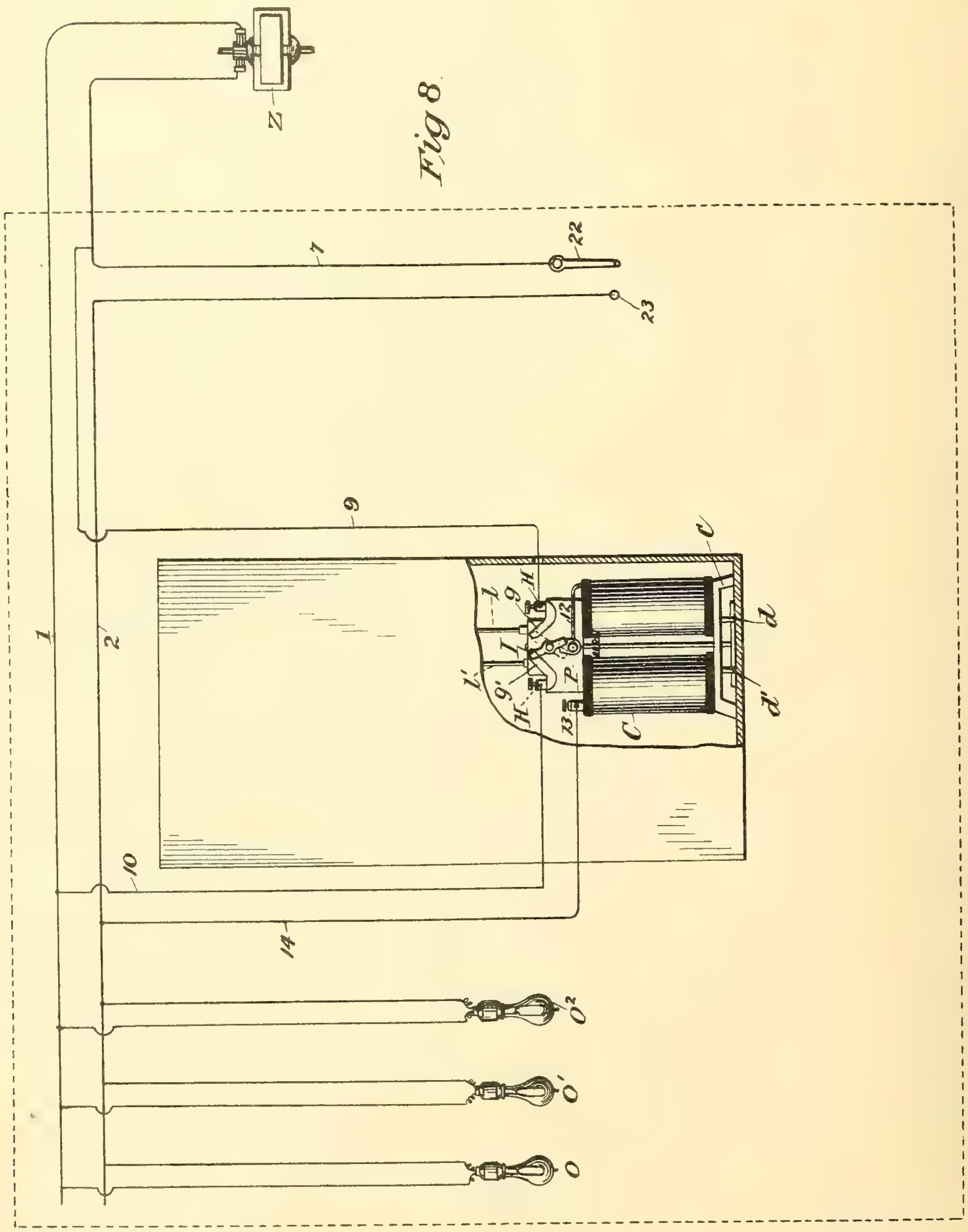
(No Model.) 5 Sheets—Sheet 5.

H. H. PATTEE.

TIME REGISTERING APPARATUS FOR ELECTRICITY.

No. 478,237. Patented July 5, 1892.



WITNESSES:

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Henry Parsons.

INVENTOR

Henry H. Pattee.

BY

Redding & Kiddle

ATTORNEYS

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRY H. PATTEE, OF MONMOUTH, ILLINOIS.

TIME-REGISTERING APPARATUS FOR ELECTRICITY.

SPECIFICATION forming part of Letters Patent No. 478,237, dated July 5, 1892.

Application filed December 11, 1891. Serial No. 414,760. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. PATTEE, of Monmouth, Warren county, in the State of Illinois, have invented certain new and useful Improvements in Time-Registering Apparatus for Electricity, of which the following is a specification.

My invention relates to mechanism or apparatus whereby the time during which a current of electricity is traversing a given circuit for any purpose whatever may be accurately registered and ascertained; and my invention has for its particular object the production of means whereby the current of electricity designed to operate any class of translating devices shall by its passage through the circuit momentarily operate or throw into operation suitable time-registering mechanism and instantly thereafter, having performed that function, shall automatically cut said means out of circuit.

The devices now generally employed to ascertain the consumption of the electric current are those by means of which the quantity of current which passes through a given circuit in a given time is registered or measured; but such means are not effectual, nor can they accurately record the quantity of current consumed, and for this reason are a source of considerable dissatisfaction to the consumer.

Devices similar in purpose to the object of my invention have been made and used; but they are unsatisfactory for one special reason, that when the circuit is closed to operate the translating devices the mechanism which the same current is designed to operate, so as to actuate the time-registering mechanism, is always in the circuit during the entire period that the translating devices are being used, thus interpolating into the circuit the resistance to the passage of the current that such actuating mechanism offers, causing a consumption of electricity which is charged to the consumer in excess of what is actually necessary to be employed for the purpose desired, or an unnecessary consumption and waste of electric energy. By my invention, however, the circuit which operates the time-registering mechanism remains preferably normally open, but is adapted to be closed and opened by means of a circuit closing and opening device of any suitable construction, and in the main circuit are located any desired translating devices, which for convenience I shall refer to as "electric incandescent lamps," intended to be illumined by the passage of the current when the circuit is closed by means of a suitable switch.

In order to determine how long the electric lamps or other translating devices are being used or how long the current is traversing the circuit, I arrange suitable time-registering mechanism, preferably maintained normally at rest, but adapted to be thrown into operation when the circuit is closed by means of an electro-magnet, which I interpolate in the circuit, and which in its active condition attracts an armature, by the movement of which the time-registering mechanism is actuated and instantaneously thereafter the electro-magnet is automatically cut out of circuit, the circuit being still maintained closed to the translating devices. Thus the resistance of the electro-magnet is in the circuit for only an infinitesimally small period of time, and only so long as is required to perform the function of starting or throwing into operation the time-registering mechanism. When it is desired to discontinue the use of the translating devices, the switch is again operated to open the circuit, cutting out the translating devices, but throwing into the circuit the electro-magnet, which, being energized, again attracts its armature, which by its movement operates on the time-registering mechanism to stop it and restore it to its normal condition, and instantaneously thereafter the electro-magnet is automatically cut out of circuit, all the parts are at rest and the consumption of current ceases. Of course the operation above described may be reversed—that is to say, the time-registering mechanism may be designed to run when the circuit is open and the translating devices not in use but adapted to be stopped when the circuit is closed by the movement of an armature caused by the momentary energization of its electro-magnet, and adapted to be set in motion again when the current is turned off. In either case the time during which the current is used will be ascertained by suitable registering or recording devices.

The foregoing describes generally the ob-

jects of my invention, which are particularly set forth in the claims hereinafter following, and in the accompanying drawings, forming a part hereof, I have illustrated one form of mechanism which embodies my invention and two methods substantially the same, of running the electric circuit in which it is to be located.

In said drawings, Figure 1 is a front view in elevation of a case adapted to hold a mechanism embodying my invention, with the door open and partly broken away, exposing the parts to view in their relative positions and showing a dial-plate which forms part of the time-registering apparatus. Fig. 2 is a front view in elevation similar to Fig 1, with the dial-plate removed, showing the parts that are located behind the dial-plate comprising the time-registering apparatus. Fig. 3 is a sectional side view in elevation of the mechanism shown in Figs. 1 and 2, taken through line $x\ x$ of Fig. 1. Fig. 4 is a front view in elevation of the electro-magnet and the parts directly acted upon by the movement of the armature. Fig. 5 is a top view taken through line $x\ x$ of Fig. 4. Fig. 6 is a sectional view taken through line $y\ y$ of Fig. 5, looking in the direction of the arrows in said figure. Fig. 7 is a diagrammatical view showing the electric circuit from the main operating-switch and the shunt-circuit, in which is located the electro-magnet and in which the rear side of the electro-magnet is exposed to view through a portion of the back of the case broken away; and Fig. 8 is a diagrammatical view similar to Fig. 7, showing another method of running the electric circuit.

A is a case of wood or other suitable material provided with a door B, having an opening b, in which is secured a circular piece of glass b', through which when the door is closed readings may be taken from a graduated and figured dial-plate located immediately behind. Within this case, preferably arranged and located as shown in Figs. 1 and 2, is one form of mechanism which embodies my invention—that is to say, in the bottom of the case is placed one or more electro-magnets C, securely fastened to the support or bed-plate c, which is secured to the bottom of case A by screws c' as shown in Fig. 1. As will also be seen in that figure, the bed-plate c is hollowed out on its under side to accommodate the armature D, which is located within it. On the top of the electro-magnet is secured the usual back armature or cross-bar E, to which is secured by the screws $e\ e'$ a metal box or case F, as shown in Figs. 1 and 2. A block of insulation G is secured to the rear side of the back armature E, from which block rise the binding-posts H H'. To this block of insulation G are secured two strips of metal $g\ g'$, which comprise the terminals of the electric circuit designed to be closed by a spring-switch I, as will be hereinafter explained. The strips $g\ g'$ are bent, as shown in Fig. 4, so that one side rests on the top of the block of insulation G and is secured thereto by the binding-posts H H', and the other side of said strips hang down and rest against the sides of the block of insulation.

To the armature D is connected a vertical rod J, which passes between the helices of the magnet up through the binding-plate E and out through the case F, and near the upper end of the rod J is an opening which is mortised out and in which is pivoted a pawl a, which has a lateral movement on the pivot a'. From the under side of the support c are secured downwardly-extending guide-rods $d\ d'$, which guide the armature in its movement upward when attracted by the electro-magnet.

L L' are two rods, preferably formed in two parts, united by couplings $l\ l'$, threaded on their inner sides to mesh with the threaded ends of the parts of the rods L L', so as to unite the threaded ends together, and are held in place by jam-nuts l^2 and l^3, and by means of these couplings and the construction of the rods in two parts the length of the rods may be properly and conveniently adjusted. The extreme lower ends of the rods fit into bearings or openings in the binding-plate E, and they pass vertically through openings in the top of the case F. Near the lower ends of the rods L L' are secured thereto heads K K', constructed as shown in the drawings, (see Figs. 1 and 2,) being cut out on their inner faces, so as to provide lugs $f\ f'$, the purpose of which will be presently explained. These heads are located within the case F, and, with the rods L L', are free to move up and down therethrough to the extent of the predetermined desired movement for which they have been adjusted, their movement upward being prevented beyond the desired extent by the upper shoulder of the lug f or f', which is broader than the openings through the case F, thereby preventing the heads from coming out thereof. Through these heads pass studs or pins $m\ m'$, which engage with the ends of a cross bar or lever M, which is midway secured to the spindle n, which passes through or is journaled in the block of insulation G, and to the outer end of the spindle n is secured a spring-piece of metal constituting the electric switch I, which is rigidly attached to said spindle by means of the nut i and bolt i', which passes through the spindle, as will be readily understood, and when the lever M on the spindle or shaft n turns the switch I will also turn, both being rigidly secured on the same shaft n. The lower end of the switch I is always in contact with one end of the magnet-wire through a metal piece or electrode P, also secured to the block of insulation G, and the upper end of said switch is adapted to move or sweep between the two terminals or electrodes $g\ g'$, before described, and thereby closing the circuit through either in the manner hereinafter set forth.

The time-registering mechanism which I preferably employ for ascertaining the num-

ber of hours or the period of time during which the translating devices have been employed—such as incandescent electric lamps, as shown—is illustrated in the drawings, of which the following is a description: In the upper part of the case A is placed a dial-plate S, behind which is located suitable clock-gearing or train of wheels so geared together that they will run by means of a suitable spring, which provides power for any predetermined period of time, and this period will be registered and may be ascertained by means of pointers R R′ R^2 and small dials s s' s^2 on the dial-plate S, said dials being graduated and figured, as shown. In Fig. 3 is shown a spring T, which when wound gives motion to the time-train in gear with the main wheel T′, operated by said spring, which through suitable intermediate gear-wheels that mesh with suitable pinions will operate the pointers R R′ R^2 and indicate on the face of the dials s s' s^2, as shown in the drawings, the number of hours or other unit of measurement that the time-train or clock has run—that is to say, the gear-wheel U is designed and geared to rotate once in ten hours, the gear-wheel V once in one hundred hours, and the gear-wheel W once in one thousand hours—and to the spindles which these gear-wheels rotate are connected the pointers R R′ R^2, which indicate on the face of the dials s s' s^2, as shown, the period of time in hours, tens of hours, and hundreds of hours that the clock has run, such shafts or spindles being suitably journaled in the supporting-frame, as usual, and the dials being graded or marked circularly into ten regular intervals. The position of the pointers will indicate at all times the number of hours that the clock has been running, and readings may be taken from these dials in the usual manner, as will be readily understood. As before stated, the time-registering mechanism is preferably normally held at rest and adapted to be set in motion by the action of the electro-magnet.

Referring to the rods L L′, their upper ends are pivoted to either end of a walking-beam Q, which is secured at its center to a sleeve t, that encircles and turns on one of the pillars which bind together the frame-plates X, between which the train of clock-gearing is mounted, and to one end of this same sleeve is connected a wheel 15, having its periphery cut out or recessed, as shown in Fig. 2, with two adjoining or connecting semicircular portions or recesses N N′, into which is adapted to fall and to be held therein a small trundle or roller 16, which is pivoted to one end of the lever 17, which lever is pivoted midway to the frame X. To the other end of this lever is secured a spring 18, the tension of which spring is upward, thus drawing or holding up one end of the lever 17 and holding down the other end of the lever, pressing the trundle 16 into one or the other of the recesses N or N′ in the wheel 15, securely locking and holding the sleeve in proper position when turned in either direction. On the sleeve t is rigidly connected or sleeved an arm 19, which has secured to it at its upper end a flat spring 20. One end of this spring is adapted to press against the rim of the balance-wheel 21 of the clock mechanism, and thereby prevent it from revolving or oscillating in its partial rotation, and thus holding the mechanism at rest, and the position of the parts when at rest is shown in Fig. 2, with the spring 20 engaging with or resting against the balance-wheel.

In Fig. 7 I have illustrated one system of running the electric circuit, comprising main wires 1, 2, and 7, in which I have inserted three translating devices, electric incandescent lamps O O′ O^2, and in the main-line circuit I place a three-way or "two-point" switch 3, which turns on the pivot 5 to points 4 and 6. In that figure the circuit from the generator Z is broken and the translating devices are not in use, because tracing the circuit from the generator Z by wire 7 to switch 3, by wire 9 to binding-post H, to electrode g, the switch I being in contact with the other electrode g', the circuit is broken or open at that point. Moving the switch 3 from point 4 to point 6 the circuit is then closed—that is to say, from the generator Z by wire 7 to switch 3, to point 6, wire 2, through the incandescent electric lamps O O′ O^2, to wire 1, and at the same time through wire 10 to binding-post H′, electrode g', switch I, wire 12, to and through electro-magnet C, binding-post 13, wire 14, and back by wire 1 to the generator Z. When the electro-magnet has been thus energized, the armature D is attracted, thereby throwing up the rod J and moving the switch I from electrode g' to electrode g, thus breaking the circuit through the magnet, and the armature falls; but the main circuit, however, remains closed—that is to say, the circuit is complete from the generator Z, wire 7, switch 3, to point 6, wire 2, to and through the incandescent electric lamps O O′ O^2, and by wire 1 back to the generator. When it is desired to open the circuit to the translating devices, the switch is moved back again from point 6 to point 4, and the circuit will then run from generator Z by wire 7 to switch 3, point 4, wire 9, binding-post H, electrode g, switch I, which is now in contact with said electrode, wire 12, electro-magnet C, binding-post 13, wire 14, to wire 1, back to the generator, and by the energizing of the magnet the armature has been again attracted, throwing up the rod J, as before, moving the switch I from electrode g to electrode g' and breaking the circuit through the magnet the armature falls and all the parts are at rest, and the circuit from the generator is now entirely open.

The manner of starting the time-registering mechanism and its operation is as follows: When the circuit to the translating devices is closed by means of the switch 3, as before explained, the electro-magnet is energized and the armature is attracted or drawn up, at the

same time forcing up rod J, causing the pawl a, connected therewith, to strike up against the lug f' on the head K', lifting it up, throwing up the rod L', working the walking-beam Q, which will throw down the other rod L, and thereby at the same time rotate the sleeve t, turn wheel 15, and throw on the trundle 16 from one or the other of the recesses N N' in the wheel 15, the trundle thereby dropping into the adjoining recess, into which it is held by the lever 17, and the spring 18, connected therewith, as before explained. The working of the walking-beam Q turns the sleeve t, which thereby throws back the arm 19, withdrawing the flat spring 20 away from the balance-wheel 21, and in so doing wipes the balance-wheel, giving it a slight initial impetus sufficient to start it on its motion and the time mechanism commences to run. By the movement of the rod J the cross-bar or lever M has been moved by the pin m', which passes through the head K', striking one end of said lever M, and the switch I, being on the same shaft with the cross-bar M, has also been moved from the electrode g' to the electrode g, automatically breaking the circuit through the electro-magnet and the armature and rod J fall, and by the falling of the rod J the pawl a, connected therewith, will strike against the lower inside inclined face of the head K', which is now in its raised position, and thereby be thrown to the other side of the rod into position ready to engage with the lug f on the head K, so as to raise the head K and rod L, connected with it, when the circuit is again closed to the electro-magnet, and the armature thereby again raised. The position of the parts when the translating devices are being used and the time mechanism running is shown in Fig. 1—that is to say, the arm 19 is thrown back and the spring 20 is away from or out of engagement with the balance-wheel, the rod L' is up and the rod L down, the pawl a on the rod J is in position under the lug f of the head K, and one end of the switch I is in contact with the electrode g; and in Fig. 4 is shown the position of the arm M and switch I when all circuits are open and the whole apparatus at rest. Moving again the switch 3, as before explained, the circuit is opened to the translating devices and closed to the electro-magnet, which attracts the armature D, moving the rod J, and the pawl a engages the lug f on the head K, lifting it and the rod up, turning the sleeve t and permitting the trundle 16 on the lever 17 to fall into the other recess into which it is held by the spring 18, and at the same time the arm 19, connected with the sleeve t, is thrown over and the flat spring 20 strikes the balance-wheel 21 and stops it, thereby stopping the clock mechanism. As before stated, the electro-magnet is in circuit only so long as is required to start or stop the time-registering mechanism, which functions, by the devices shown and described and which I preferably employ, are performed in an infinitesimally short period of time, and notwithstanding that the electro-magnet is instantly automatically cut out of circuit the main circuit to the translating devices remains closed until the main operating-switch is again moved to cut out the translating devices; but by this movement the circuit to the electro-magnet is again closed and the electro-magnet is in circuit again only so long as is required to perform the function of stopping the time-registering mechanism when it is automatically cut out of circuit.

In Fig. 8 I have illustrated another mode of installing or connecting up my invention, which in some respects is preferable to that just hereinbefore described, in which it will be observed that wire 9 is connected to binding-post H and to wire 7 between switch 22, which may be an ordinary two-way or "one-point" switch, and generator Z. Wire 10 is connected to binding-post H' and wire 1, and wire 14 is connected to binding-post 13 and wire 2. When switch 22 is open and switch I in contact with electrode g', the circuits from the generator through the translating devices and electro-magnet are both cut or broken at point 23. Consequently no current will flow and the translating devices and electro-magnet will be unaffected so long as switch 22 remains open. When switch 22 is moved onto point 23, a circuit will be formed through wire 7, switch 22, point 23, wire 2, lamps O O' O^2, and back by wire 1 to generator Z. At the same time a circuit is also formed through wires 2 and 14, electro-magnet C, switch I, (now in contact with electrode g',) wire 10, and wire 1, back to generator Z. At this juncture the electro-magnet will be energized and the switch I shunted onto electrode g precisely in the same manner as hereinbefore explained, thus instantaneously cutting the electro-magnet out of circuit while the main circuit to the translating devices remains intact. If with the switches thus placed on points 23 and g the circuit is traced from the generator Z, through wire 7, point 23, wires 2 and 14, binding-post 13, electro-magnet C, switch I, electrode g, and wire 9, we return to wire 7, which, being now of the same polarity as wire 9, the current is neutralized; or, in other words, no current will flow nor will any action be had upon the electro-magnet. Again, commencing at the generator and tracing wire 9 through contact g, switch I, electro-magnet C, wire 14, translating devices O O' O^2, wire 1 to generator Z, the electro-magnet and translating devices are found to be in a series circuit, but as the resistance of the electro-magnet is much higher than that of the translating devices no current will flow through this source, but so soon as switch 22 is thrown off from point 23, when it is desired to stop the operation of the translating devices, the current will then flow through wire 9, electrode g, switch I, electro-magnet C, wire 14, translating devices O O' O^2, wire 1, back

to generator Z, forming a completed circuit through the electro-magnet and translating devices in series with each other, thereby causing the electro-magnet to be again energized, which by its operation as hereinbefore described the switch I will be shunted back onto electrode g' and the whole apparatus thereby placed at rest, in which condition it will remain until the switch 22 is again operated to actuate the translating devices.

My invention may be utilized, no matter how many translating devices there may be in any given circuit, and the charge to the consumer ascertained according to the number of hours or other unit of time-measurement that the current from the source of electricity has been supplied and the number of translating devices employed, although, of course, a separate mechanism embodying my invention may be arranged in circuit to each separate translating device, if desired.

As will be understood, the pointers R R′ R^2 have been rotating with their spindles during the period of time that the circuit has been closed to the translating devices, and thereby recording in units, tens, and hundreds hours the length of time that the current is being used. Thus I provide a simple and efficient means for accurately computing and determining the value of the current that has been furnished over a given circuit for any given purpose by ascertaining exactly the period of time during which the current has traversed the circuit in any predetermined units of measurement. The time-registering mechanism being in motion preferably during the time the circuit is in use, the pointers on the dial-plate will denote or record at any time the aggregate period of time during which the current has been furnished, the pointers having been originally set or turned back to the zero-point.

While I have shown and described a time-registering mechanism having as its pulsative device a balance-wheel, yet my invention may be applied to a time-registering mechanism of any desired construction having any of the usual escapement devices, to which may be given an initial impetus by the action of an electro-magnet to start the mechanism and a corresponding action of the electro-magnet to stop the mechanism—that is, the electro-magnet controls the time-registering mechanism—and while the mechanism before described and shown in the drawings embodies my invention and effectually accomplishes my desired objects yet I do not limit my invention to the precise parts in number, size, or construction, nor to the relative arrangement shown and described; but

What I do claim as my invention is set forth in the following claims, viz:

1. The combination, with a main circuit from a source of electricity, of one or more translating devices arranged therein, a switch to control said circuit, an electro-magnet arranged in a shunt-circuit from the main circuit, a switch to control the shunt-circuit adapted to be operated by the electro-magnet, and time-registering mechanism adapted to be stopped or started by said electro-magnet.

2. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet, also arranged in said circuit, a switch to control the circuit, time-registering mechanism, and means operated by said electro-magnet to automatically stop or start said time-registering mechanism, and means, also operated by the electro-magnet, to automatically cut the electro-magnet out of circuit.

3. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet also arranged in said circuit, a switch to control the circuit, and a separate switch adapted to be operated by the electro-magnet to cut the electro-magnet out of circuit.

4. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet also arranged in said circuit, a switch to control the circuit, time-registering mechanism adapted to be started or stopped by said electro-magnet, and a separate switch adapted to be operated by the electro-magnet to cut the electro-magnet out of circuit.

5. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet also arranged in said circuit, a switch to control the circuit, time-registering mechanism adapted to be stopped and started by said electro-magnet, and means operated by said electro-magnet to automatically cut said electro-magnet out of circuit.

6. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet also arranged in said circuit, an armature adapted to be actuated by the electro-magnet, a switch to control the circuit, time-registering mechanism adapted to be stopped or started by the movement of said armature, and means operated by said armature to automatically cut the electro-magnet out of circuit.

7. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, a switch to control said circuit, an electro-magnet also arranged in said circuit, an armature adapted to be actuated by said electro-magnet, time-registering mechanism, and means adapted to be operated by said armature to start or stop said time-registering mechanism and at the same time cut the electro-magnet out of circuit.

8. The combination, with a main circuit from a source of electricity, of one or more

translating devices arranged therein, a switch to control the main circuit, an electro-magnet arranged in a shunt-circuit from the main circuit, time-registering mechanism adapted to be started or stopped by said electro-magnet, and means also operated by said electro-magnet to automatically cut the electro-magnet out of circuit.

9. The combination, with a source of electricity, of one or more translated devices arranged in a circuit therefrom, a switch to control said circuit, an electro-magnet also arranged in said circuit, an armature adapted to be actuated by said electro-magnet, time-registering mechanism, means adapted to be operated by said armature to start or stop said time-registering mechanism, and a switch also adapted to be operated by the movement of said armature to automatically cut the electro-magnet out of circuit.

10. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, a switch to control said circuit, time-registering mechanism adapted to be started or stopped by said electro-magnet, an armature adapted to be actuated by said magnet, and a switch adapted to be operated by the movement of the armature to automatically cut the electro-magnet out of circuit.

11. The combination, with an electro-magnet and its armature, of the rod J, connected therewith, pawl *a*, connected with said rod, rods L L′ and heads K K′, connected with said rods, walking-beam Q, to which the rods L L′ are attached, and sleeve *t*, all arranged and adapted to be operated by the movement of said armature when the electro-magnet is energized, substantially as set forth.

12. The combination, with an electro-magnet and its armature, of the rod J, connected therewith, pawl *a*, connected with said rod, rods L L′, couplings *l l′*, heads K K′, connected with said rods, walking-beam Q, and sleeve *t*, all arranged and adapted to be operated by the movement of said armature when the electro-magnet is energized, substantially as set forth.

13. The combination, with an electro-magnet and its armature, of the rod J, connected therewith, pawl *a*, rods L L′, connected with the walking-beam Q, sleeve *t*, heads K K′, connected with said rods, and pins *m m′*, which pass through said heads K K′, lever M on the shaft *n*, and switch I, all arranged and adapted to be operated by the movement of said armature when said electro-magnet is energized, substantially as set forth.

14. The combination, with a source of electricity, of a switch to control the circuit leading therefrom, an electro-magnet in said circuit, an armature adapted to be operated by said electro-magnet, a rod J, connected with said armature, a pawl *a*, connected with said rod, rods L L′, connected to the walking-beam Q, which turns the sleeve *t*, heads K K′, connected with said rods L L′, pins *m m′*, which pass through said heads K K′, a lever M adapted to be moved by said pins, a switch I on the same shaft with the lever M, an electrode P, with which said switch I makes contact, and electrodes *g g′*, all arranged and adapted to be operated by the movement of said armature when the electro-magnet is energized, substantially as set forth.

15. The combination, with a time-registering mechanism, of means to start or stop said mechanism, consisting of the arm 19 on the sleeve *t*, a spring 20, connected with said arm, lever 17, having the spring 18 attached at one end and the trundle 16 pivoted to the other end, wheel 15 on said sleeve *t*, provided with recesses N N′ in its periphery, into which the trundle 16 is adapted to fall and to be held therein by the spring 18, and walking-beam Q on the sleeve *t*, said mechanism adapted to be actuated by an electro-magnet, substantially as set forth.

16. The combination, with a time-registering mechanism having as its pulsative device a balance-wheel, of means to start or stop said mechanism, consisting of the arm 19 on the sleeve *t*, a spring 20, connected with said arm, lever 17, having the spring 18 connected at one end and the trundle 16 pivoted to the other end, wheel 15 on said sleeve *t*, provided with recesses N N′ in its periphery, into which the trundle 16 is adapted to fall and to be held therein by the spring 18, and walking-beam Q on the sleeve *t*, said mechanism being adapted to be started or stopped by an electro-magnet, substantially as set forth.

17. The combination, with a time-registering mechanism, of a graduated dial-plate, pointers in gear with said time-registering mechanism, an escapement device forming part of said time-registering mechanism, and means adapted to start or stop the said time-registering mechanism, consisting of an arm 19 on the sleeve *t*, spring 20, connected with said arm, adapted to engage with said escapement device, walking-beam Q, also connected with the sleeve *t*, and rods L L′, connected with the said walking-beam, said rods being adapted to be moved up or down to start or stop the time-registering mechanism by the action of an electro-magnet, substantially as set forth.

18. The combination, with a time-registering mechanism, of an escapement device forming part thereof and means adapted to start or stop said time-registering mechanism, consisting of an arm adapted to engage with said escapement device, a walking-beam connected with said arm, and means to move said walking-beam adapted to be operated by an electro-magnet, substantially as and for the purpose set forth.

19. The combination, with a source of electricity, of one or more translating devices arranged in a circuit therefrom, an electro-magnet also arranged in said circuit, a switch to

control the circuit, time-registering mechanism, and an escapement device forming part thereof, and means adapted to start or stop said time-registering mechanism, consisting of an arm adapted to engage with said escapement device, a walking-beam connected with said arm, and means to move said walking-beam adapted to be operated by said electro-magnet, substantially as and for the purpose set forth.

This specification signed and witnessed this 2d day of December, 1891.

HENRY H. PATTEE.

In presence of—

F. H. SMITH,

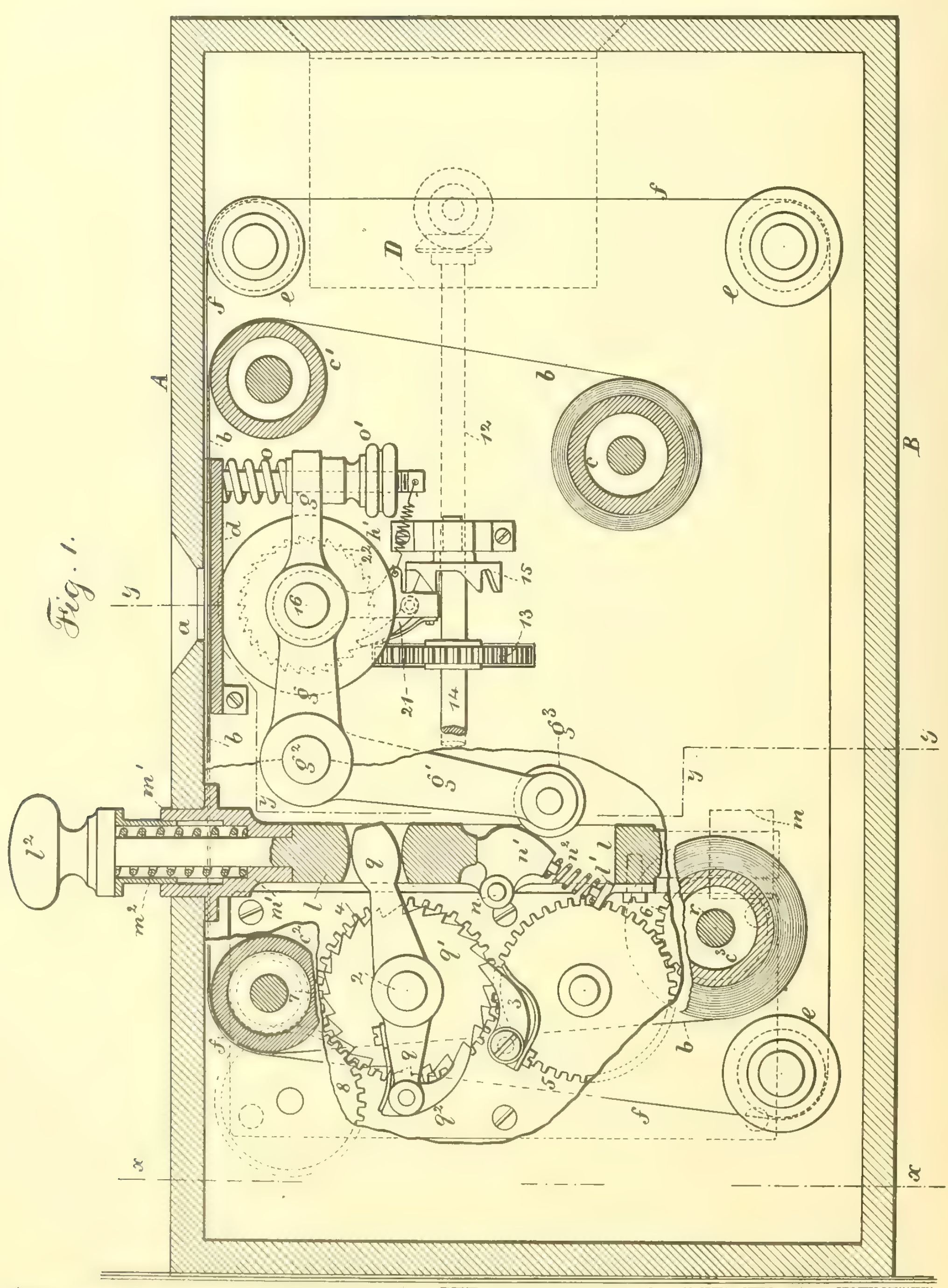
W. C. ARTHUR.

(No Model.) 3 Sheets—Sheet 1.

J. C. KOCH.

WORKMAN'S TIME RECORDER.

No. 478,284. Patented July 5, 1892.



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(No Model.) 3 Sheets—Sheet 2.

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WORKMAN'S TIME RECORDER.

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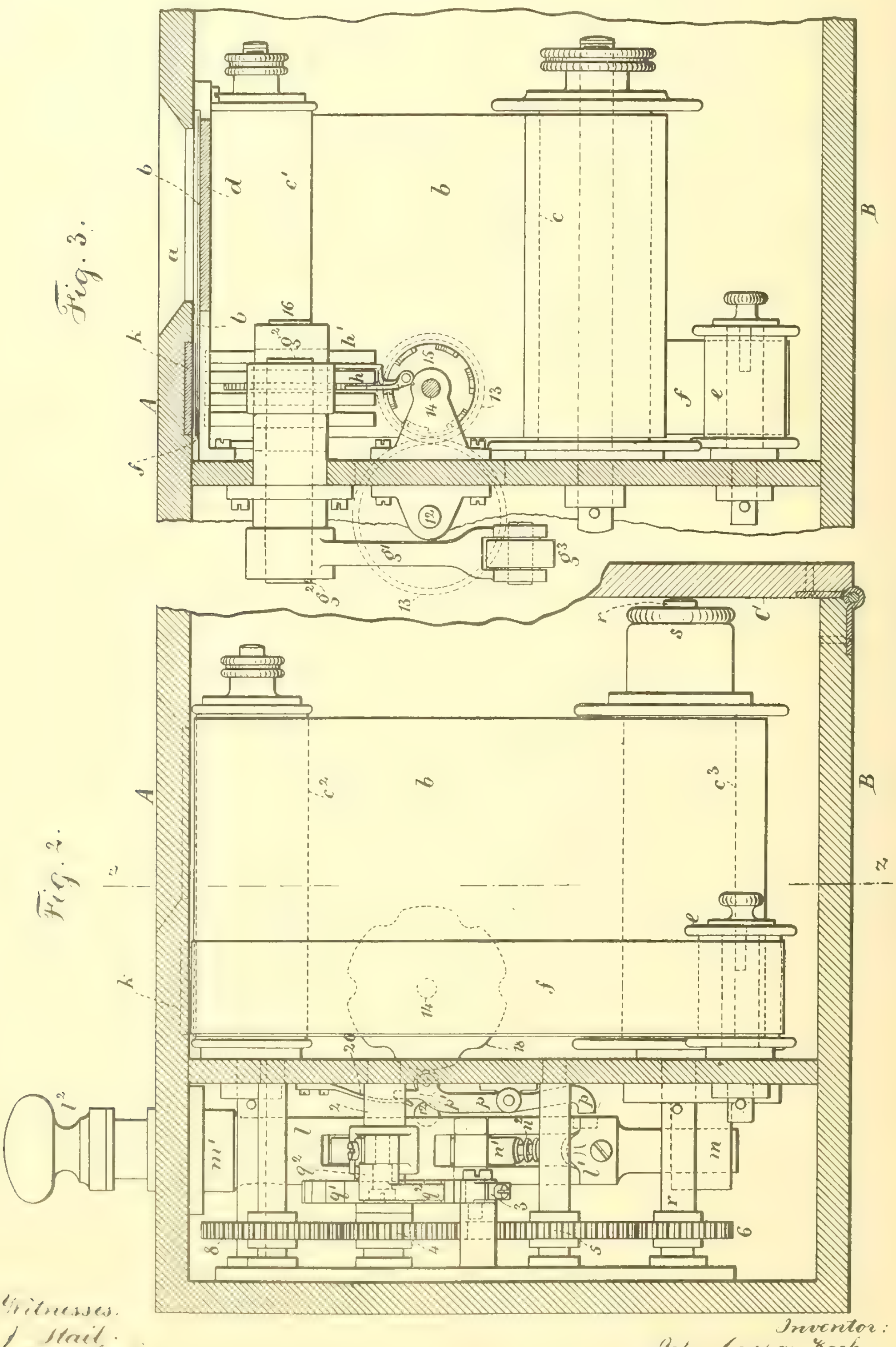

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(No Model.)

3 Sheets—Sheet 3.

J. C. KOCH.

WORKMAN'S TIME RECORDER.

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Fig. 4.

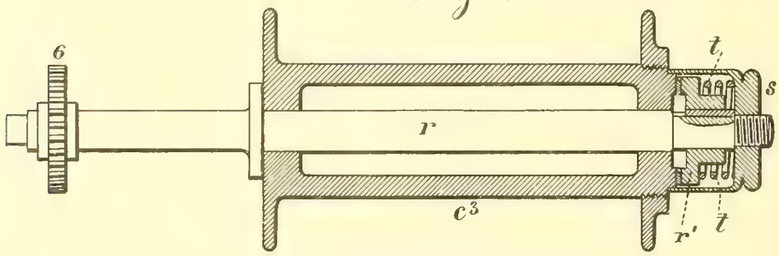


Fig. 5.

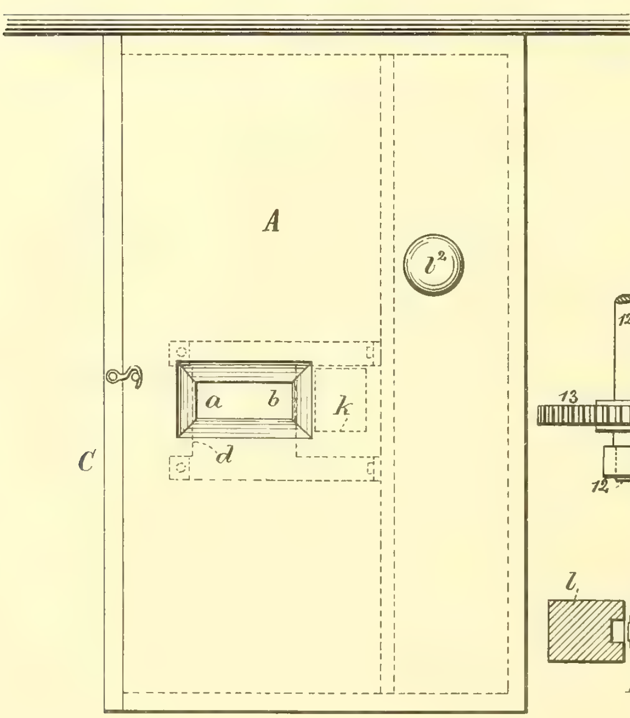
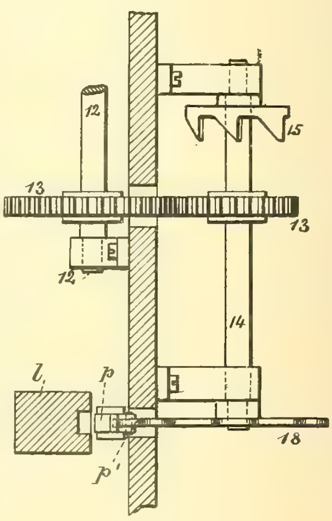


Fig. 6.



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UNITED STATES PATENT OFFICE.

JOHN C. KOCH, OF BERLIN, GERMANY.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 478,284, dated July 5, 1892.

Application filed October 28, 1889. Serial No. 328,472. (No model.)

To all whom it may concern:

Be it known that I, JOHN CASPAR KOCH, a citizen of the United States, residing at Berlin, Prussia, Germany, have invented an Improvement in Recording Apparatus, of which the following is a specification.

The object of this invention is to give opportunity for recording a name and the time at which the name is written upon a strip or web of paper, so that workmen or others going into a factory or building or passing a given place can record their names and the hour at which the record is made, and the same apparatus is available as a register for a hotel to indicate the time of arrival simultaneously with the recording of the name, and it may also be used in public or private offices for the names of callers, whether the office is open or closed.

In my improvement a strip or web of paper is within a case having an opening adapted to allow the name or number of the person to be written upon the surface of the paper, and by a push-button the paper is moved along progressively a sufficient distance for the reception of each name or number, and in connection with this apparatus are recording-wheels containing the hour and minutes and the day of the month and the year or any other desired registration indicating time, and where the hours or hours and minutes are provided for a clock-work is employed to move the recording apparatus and an impression is made upon the paper adjacent to the name or number written thereon automatically by a connection with the push-button made use of in moving the paper along progressively.

In the drawings, Figure 1 is a vertical section at the line $z\ z$, Fig. 2, with part of the partition of the case broken open and some of the parts behind it in section. Fig. 2 is a section at the line $x\ x$, Fig. 1; and Fig. 3 is a section at the line $y\ y$, Fig. 1. Fig. 4 is a section through the axis of the winding-roll for the paper. Fig. 5 is a plan view, in smaller size, of the surface of the case; and Fig. 6 is a diagram, partially in section, representing the connection from the clock-work shaft to holding-catch of the slide.

The case employed for containing the apparatus may be of any suitable material, and the case may stand vertically or be supported horizontally. I prefer the latter, in which instance the top A of the case will lie horizontally, or nearly so, and the bottom B of the case will rest upon a table or other support, or one end may be placed against the wall, as shown, and it is preferable to hinge the side C, as illustrated in the drawings, so that the case can be opened to give access to the parts for introducing a fresh roll of paper and for setting such of the recording-wheels as may be actuated by hand.

In the part A of the case is an opening a, behind which opening is a table d, there being a space between the inner side of the top A of the case and the table d for the passage of the strip or web of paper b, and this web of paper is upon a roll c and passes around the roll c' c^2 and is wound upon the roll c^3. The rolls c' and c^2 are in such a position that the web of paper b will pass over the surface of the table d and in close proximity to the inner surface of the top A of the case, and the opening a in the case is sufficiently large to allow the name or number of the person to be written upon the paper web b through the opening a, and the paper is to be moved progressively after each name or number that is written by pushing upon the button l^2. The button l^2 is at one side of the web of paper, so as not to interfere with the same, and the stem of the button passes through the case and is connected with the slide l, and there is around the stem of the button and within a fixed case m' a helical spring m^2, that serves to project the button l^2 and move the slide l in an opposite direction to that given by hand. The slide l is supported at its rear end by a bearing m, through which it is free to move, and there is a cross-shaft 2 supported within the case and carrying a ratchet-wheel q', adjacent to which is a retaining pawl and spring 3 to hold said ratchet-wheel as it is moved progressively by a lever q, which has the shaft 2 for its pivot, and it is provided at the end with a spring-pawl q^2, and the other end of this lever q passes into a mortise in the slide l, so that as this slide l is moved by the push-button and spring the ratchet-wheel q' is moved progressively one or more teeth each time the button l^2 is pressed upon, and upon the shaft 2 is a gear-wheel 4, giving motion to an intermediate gear-wheel 5, and this

wheel 5 rotates a gear 6 upon the shaft r of the winding-up roller c^3. In Fig. 4 I have represented a friction-spring t and friction-coupling r' between the end of the winding-up roller c^3 and the nut s upon the end of the shaft r, so that the shaft r may turn sufficiently to wind up the paper; but the shaft may move after the paper is wound without drawing the paper along, the friction-coupling r' sliding upon the end of the wind-up roll c^3, and there is a gear-wheel 7 upon the shaft of the roller c^2 and an intermediate wheel 8 between the gear 7 and the gear 4 upon the shaft 2, so that this roll c^2 will be moved the proper distance for carrying along the paper every time the button l^2 is acted upon, so that this roller c^2 becomes the measure of the amount of paper drawn along, and the duty of the roll c^3 is simply to wind up the slack of the paper, and the journals of the rolls c and c' afford the necessary friction to maintain a slight tension upon the paper as it is drawn along.

In cases where an impression is made upon the paper at the same time that the push-button l^2 is acted upon I provide a web of ribbon f, prepared with carbon or coloring-matter and passing around rolls e and between the paper and the inner surface of the case-top A, preferably near one margin of the paper, and in consequence of this printing-ribbon f passing over the roller c^2 while in contact with the surface of the paper such printing-ribbon will be moved along from time to time similarly to the ribbon made use of in type-writing machines, and it is preferable to make use of a pad k of rubber or similar material let into the inner surface of the top A of the case opposite to where the impression is to be made by type or character wheels h h'. These type or character wheels h h' are upon a shaft supported by a lever g g', pivoted at g^2 and having a roller g^3 at the end, against which the cam n' upon the slide l acts to move the lever and give an impression from the type or character wheels h h' against the back of the paper, and thereby cause the printing-ribbon f to mark the surface of the paper as the types or characters press the paper and the ribbon toward the pad k. The cam n' is hinged at n and has a spring n^2 between the end of the cam and the support l' upon the slide l, and the cam n' is preferably within a notch or mortise in the slide l, so that when the slide l is moved by the button l^2 the cam n' operates upon the roller g^3 and lever g g' to move the character-wheels and give the impression, and as the slide l is moved in the opposite direction by the spring m^2 the cam n' swings upon its pivot n against the action of the spring n^2 and passes by the roller g^3 without giving a second impression by the letter or character wheels upon the paper, and I prefer to make use of a spring o and an adjusting-nut o' around the screw that passes through the spring and the end of the lever g, so that such lever and the character-wheels may be held in the proper position adjacent to the paper; but the spring o will yield as the cam n' acts to give the impression.

It is now to be understood that the type or character wheels h h' may be of any desired kind, and that where the hours and minutes only are to be recorded one wheel will have characters upon it to indicate the hour of the day from "1" to "12" or from "1" to "24" and the other wheel the minutes or, say, the five or other minute divisions, and the minute-wheel will receive motion from a clock-work and rotate the hour-wheel one division each revolution of the minute-wheel by any suitable mechanism, such as that made use of in a counting-register. I have represented a shaft 12 to be rotated by clock-work, and the gearing 13 drives a second shaft 14, and from the second shaft 14 motion is to be given to the minute-wheel h by any suitable connection. I have represented a series of inclined planes upon a wheel 15, which inclined planes act upon a lever that has the shaft 16 for its pivot and carries the pawl 21, that acts upon a ratchet-wheel 22, adjacent to the minute-wheel h, to turn the same progressively by the action of the inclines and in harmony with the clock-work.

If desired, two other wheels may be added upon the shaft 16 for containing the day of the month and the month of the year, similar to the wheels made use of in the well-known stamps for dating the reception of letters or other communications, and these wheels may be turned by hand, the one that indicates the day of the month being set each day, and all of these type and character wheels, being moved by the lever g g', print the proper characters upon the strip of paper adjacent to the name or number written thereon through the opening a, and it will be apparent that when the push-button l^2 is operated the paper with the name or number upon it is moved along and the marks are out of sight and the proper space furnished for the reception of the next name or number.

It is preferable to move the character-wheel periodically and with rapidity and then to allow such character-wheel to remain quiescent during the time that the printing operation may be performed. For this reason it is desirable to make the inclined planes around the wheel 15 at intervals, and upon the same shaft 14 is a cam-wheel 18, acting against the roller p' of the latch p, the other end of the latch being adapted to pass into a hole in the slide l by the action of the spring 20, and the cam-wheel 18 is made with notches around its periphery, corresponding in number with the inclines on the wheel 15, so that during the time one of the inclines is moving the character-wheel h the roller of the latch p will be in one notch of the cam 18 and the latch p will hold the slide l, so that the push-button cannot be operated during the time that the character-wheel is being turned, and during the period of rest to the character-wheel the cam 18 disconnects the latch p from the slide l, al-

lowing the recording apparatus to be brought into operation. The clock-work in the box or case D, that drives the shaft 12, can be of any desired character, and the face thereof can be seen at the side or top of the case, and if an ordinary calendar-clock is used the date will also be denoted.

I claim as my invention—

1. The combination, with the case having an opening and a table behind the opening, of rolls for supplying and guiding a web of paper, a wind-up roll, a push-button which extends outside the case, a lever, pawl, and ratchet-wheel receiving motion from the push-button and gearing therewith connected for moving the wind-up roller, a range of character-wheels, and connection for a clock mechanism for rotating such character-wheels, a lever for supporting the character-wheels, and a cam on the inner portion of the push-button for moving the lever and type-wheels and impressing the characters on the same, substantially as specified.

2. The combination, with the containing-case having an opening therein and the supporting table and rollers for supplying, guiding, and winding up the paper, of a push-button and slide, a ratchet-wheel and pawl and the gearing moved thereby, and a frictional connection between the gearing and the winding-up roller, and a letter or character wheel, and a lever carrying the letter-wheel, and a connection from the same to the push-button for impressing the character on the paper, substantially as set forth.

3. The combination, with the containing-case and the roll c for supplying a web of paper, of the guide-rolls c' c^2 and winding-up roll c^3, the gearing connecting the rolls c^2 c^3, the ratchet-wheel for giving motion to the gearing, a friction device between the roll c^3 and the gearing, a push-button, lever, and pawl for acting upon the gearing to move the paper, the type or character wheels, a lever for supporting and moving the same, and a cam acted upon by a slide for giving motion to the lever and character-wheels, substantially as set forth.

4. The combination, with the containing-case having an opening in the same and a table behind the opening, of a roll for supplying the web of paper, the guide-rolls c' c^2, the wind-up roll and mechanism for actuating the same, substantially as specified, a ribbon containing coloring-matter adjacent to the web of paper near one edge, type or character wheels and a connection for moving the same by clock-work, and a lever and cam for supporting the character-wheels and a push-button and cam for impressing the character-wheels, substantially as set forth.

Signed by me this 21st day of October, 1889.

JOHN C. KOCH.

Witnesses:

GEO. T. PINCKNEY,
WILLIAM G. MOTT.

(No Model.)

E. E. ELLIS.

SETTING MECHANISM FOR TIMEPIECES.

No. 478,321. Patented July 5, 1892.

Fig. 1.

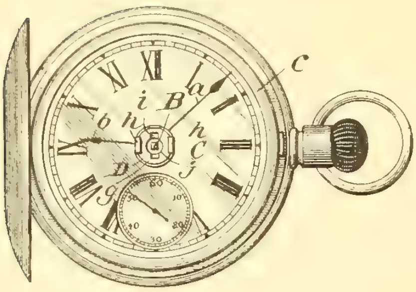


Fig. 2.

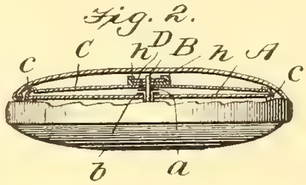


Fig. 3.

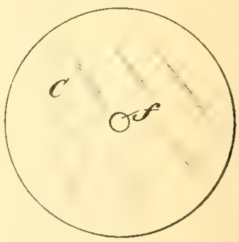


Fig. 4.

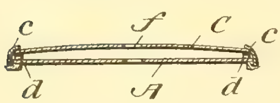


Fig. 5.

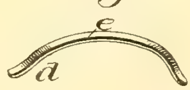


Fig. 6.

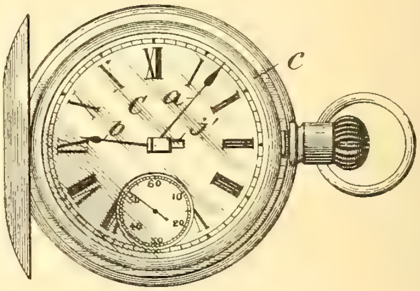


Fig. 7.

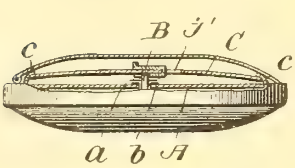


Fig. 8.

Fig. 9.

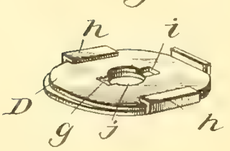
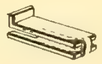


Fig. 10.



Witnesses
Edwin L. Bradford
Leonard M. Parr.

Edward Everett Ellis
Inventor

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD EVERETT ELLIS, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR OF ONE-HALF TO BENJAMIN L. WHEELER, OF SAME PLACE.

SETTING MECHANISM FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 478,321, dated July 5, 1892.

Application filed March 16, 1892. Serial No. 425,155. (No model.)

To all whom it may concern:

Be it known that I, EDWARD EVERETT ELLIS, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Time-Setting Crystals for Watches and Clocks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in time-setting devices for watches and clocks; and it consists, substantially, in such novel features thereof as will hereinafter be more particularly described and claimed.

The object of the invention, generically stated, is to provide for the setting or moving of the hands of a watch or clock by means of the usual crystal or glass front placed over or upon the dial or face thereof, thereby dispensing with all former modes of time-setting, substantially as will more fully hereinafter appear, when taken in connection with the accompanying drawings, in which—

Figure 1 represents a top plan view of a watch having my improvements embodied in connection therewith; and Fig. 2 is a transverse sectional view thereof, taken centrally through the hand-post and movable slide which engages the same. Fig. 3 is a top or plan view of the movable or revolving crystal. Fig. 4 is a sectional elevation taken through the crystal, its ring, and the spring or elastic devices for holding the crystal against accidental displacement or movement. Fig. 5 is a view in perspective of one of the springs used in connection with the crystal and its ring. Fig. 6 is a view similar to Fig. 1, representing a modification. Fig. 7 is a view similar to Fig. 2, representing, also, said modifications. Fig. 8 is a view of the modified form of crystal, similar to that shown in Fig. 3. Fig. 9 is a detail view representing the disk with its guides and the slide which moves thereon. Fig. 10 is a similar view of the modified form of slide.

In carrying my invention into effect I provide the dial or face of the watch or clock with a crystal or front that is capable of revolving or being moved in its holding-ring by simply pressing on the same slightly with the thumb or finger and giving a turn thereto, and for the purpose of maintaining said crystal or front against accidental displacement while the watch is being carried in the pocket I provide suitable elastic or spring devices for pressing upwardly against said crystal with sufficient force to hold it in place. Centrally of the said crystal a circular or other shaped opening is formed concentric with the center post upon which the hands of the watch or clock are fixed or placed, and connected or otherwise attached to the crystal is a small thin steel or other metallic plate having an opening coinciding with the central opening of the crystal. The said plate is made as small as practicable and is formed or provided to opposite sides of its opening with parallel guides to receive and admit of the working back and forth of a small slide or key arranged therein. Instead of these guides being formed with the plate they may be formed separately and then attached to the said plate in any suitable secure manner. The movable slide or key is also made as small as practicable, so as not to conceal from view at any time any more of the hands of the watch or clock than possible, and said slide or key is cut out or so shaped on its inner end as to embrace the hand-post when moved inwardly, and thus by moving said slide inwardly so as to engage or embrace said post and then pressing slightly upon the crystal and turning the latter the hands of the watch or clock will be correspondingly turned and the said hands accurately set or moved to indicate any hour and minute of time desired. This much is sufficient to indicate the practicability of my invention; but it will of course be understood that many other ways could be resorted to for accomplishing the desired object by the use of the same principle, and consequently I do not wish to be understood as limiting myself to this precise detail of construction and arrangement. For instance, instead of the central opening in the crystal I could form an oblong slot therein to intersect with the center thereof, and then I would employ a slide

moving in said slot and constructed on its under side or portion, so as to receive or embrace the hand-post in a similar manner on the under side of the crystal. In this instance the slide would of necessity have to consume a greater area of space than in the first instance; but in either case the device would be thoroughly operative in accomplishing the object or purpose intended. In either instance no other alteration in the watch is required than to simply make the hand-post extend up a little higher than is now done; but this can be very easily accomplished at a small cost. The construction resorted to in both of the instances recited is illustrated herein, and no difficulty will be experienced in understanding the same. It will also be seen that no material change in the crystal is made which would alter its function as such, and, still further, it will be seen that in the event of breakage of the crystal the same can be replaced at an expense that is very slight as compared with the cost of repairing many of the forms of time-setting devices for watches and clocks now in use. The several parts employed can be made very small and attractive, thereby detracting nothing whatever from the beauty or ornamental appearance of the watch or clock, which it is so desirable to maintain.

Reference being had to the drawings by the letters marked thereon, A represents an ordinary clock or watch dial, and B the post upon which the indicating-hands *a* and *b* are placed and by which said hands are caused to move or turn by the action of the watch mechanism located within the case in the usual manner. As will be observed, the said post B is extended up slightly higher than ordinary, so as to project very slightly through the crystal and still not be in the way of the watch-case when the latter is closed.

C represents the movable or revolving crystal constructed in accordance with my invention, the same being seated in the usual manner in the ring *c*, provided therefor, and for the purpose of maintaining said crystal stationary or in place sufficiently tight, so as to be prevented from accidental turning while carrying the watch in the pocket or otherwise, I locate beneath the same two or more very fine yet sufficiently strong elastic cushions or springs *d*, which are curved in one direction, so as to conform to the shape of the holding-ring or the edge of the crystal, as well as being curved upwardly, as shown at *e*, so as to exert by their resiliency sufficient upward force to keep the crystal in place. The said crystal is formed with the central opening *f*, which is concentric with the hand-post of the watch, and surrounding said opening is a small thin plate or disk having a similar opening *j*, to opposite sides of which are the parallel guides *h h*. Working back and forth in said guides is a movable slide or key D, constructed with a central opening to permit passage of the post B and having a square or rectangular notch *i*, into which the correspondingly-shaped post B is received when said slide is moved inwardly. The said slide is also preferably formed on its other end with a very slightly-upturned edge, so as to better enable the same to be moved back and forth by the aid of the finger. To provide against the slide becoming useless from the wear of the edges of the notch thereon, I also provide a similar notch *g* on the opposite side of the central opening in the slide, and thus can the latter be moved in either direction to have the same engage with the post. When the post is so engaged by the slide, it is obvious that by simply pressing lightly upon the crystal and turning the same the hands of the watch or clock will also be caused to turn, and thus can the time be accurately changed or set to any hour of the day.

In Figs. 6, 7, 8, and 10 I have shown the modification referred to, and wherein it will be seen that instead of the central opening in the crystal a simple oblong opening *j* is made, and in which the slide works. In this instance the opening *j* of course crosses or coincides in direction with the position of the hand-post, while the slide itself is constructed of an inner and outer portion, the former of which being constructed to embrace the post in the manner hereinbefore explained in connection with the preferred construction.

From the foregoing it will be seen that ample provision is made against any accidental movement or displacement of the crystal; but even though the provision did not exist it will be apparent that the hands of the watch could not ever be affected or accidentally moved by the slide while the same remains pushed back or out of contact or engagement with the post.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In time-setting devices for watches and clocks, a movable or revolving crystal provided with means for engaging and disengaging the hand-post of a watch or clock, substantially as shown, and for the purpose described.

2. In time-setting devices for watches and clocks, a movable or revolving crystal having a central opening and provided with a slide for engaging the hand-post of a watch or clock, substantially as described.

3. In time-setting devices for watches and clocks, a movable or revolving crystal having a central opening, and a disk surrounding said opening and having parallel guides, and a slide moving in said guides having a notch for engaging or receiving the hand-post of a watch or clock, substantially as described.

4. In time-setting devices for watches and clocks, a movable or revolving crystal having a central opening surrounded by a disk formed with parallel guides, and a slide moving in said guides having its outer edge upturned slightly and formed with oppositely-arranged notches for engaging the hand-post of a watch or clock when said slide is moved

toward the same in either direction, substantially as and for the purpose described.

5. In time-setting devices for watches and clocks, the combination of a movable crystal having a central opening, springs or elastic devices for pressing said crystal outwardly, a disk surrounding said central opening and having parallel guides, and a slide moving in said guides having a notch for receiving the hand-post of a watch or clock, substantially in the manner shown, and for the purpose described.

6. In time-setting devices for watches and clocks, a crystal having an opening therein and provided with a movable key or slide surrounding said opening for engaging and disengaging the hand-post of a watch or clock, substantially as described.

7. In time-setting devices for watches and clocks, the key for engaging and disengaging the hand-post of a watch or clock, the same consisting of a movable slide provided with a central opening intersected at opposite points by notches, substantially as described.

8. In time-setting devices for watches and clocks, the combination of a movable or revolving crystal having an opening therein, the hand-post extending through said opening, and a movable key or slide for engaging and disengaging said hand-post, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWARD EVERETT ELLIS.

Witnesses:
CURTIS LAMMOND,
M. DORIAN.

(No Model.) 2 Sheets—Sheet 1.

J. JACOBI.
ELECTRIC TIME ALARM.

No. 478,865. Patented July 12, 1892.

Fig. I.

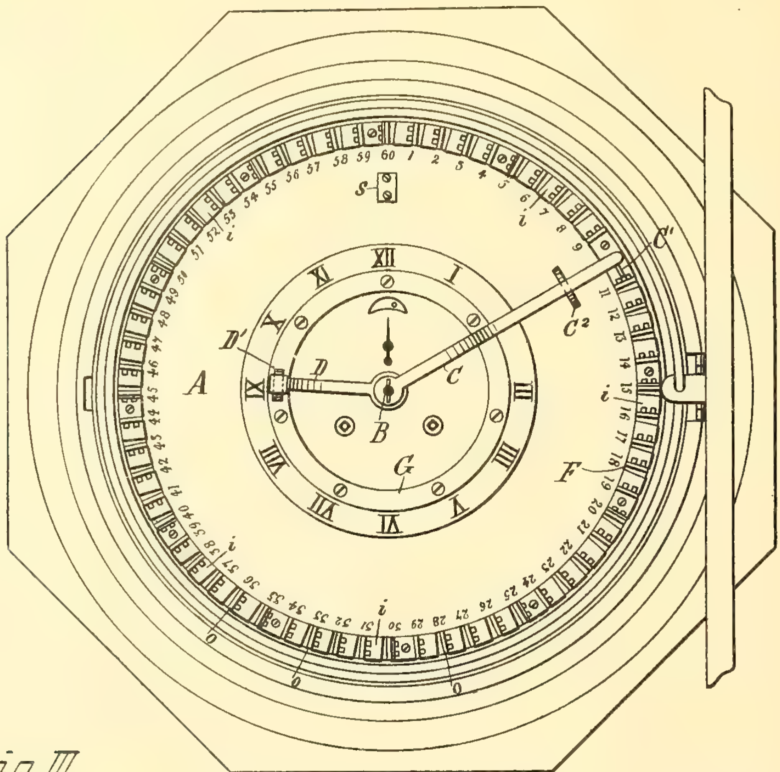


Fig. III.

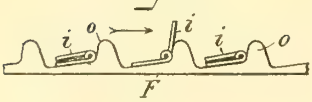


Fig. II.

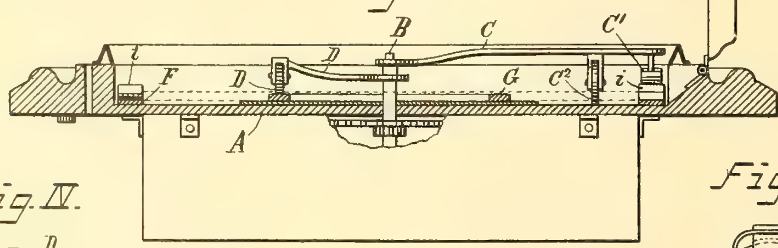


Fig. IV.

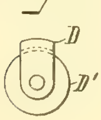
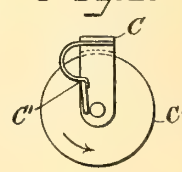


Fig. V.



WITNESSES:

Louis W. Frost

Theodore Martine

INVENTOR

John Jacobi

(No Model.) 2 Sheets—Sheet 2.

J. JACOBI.

ELECTRIC TIME ALARM.

No. 478,865. Patented July 12, 1892.

Fig. VI.

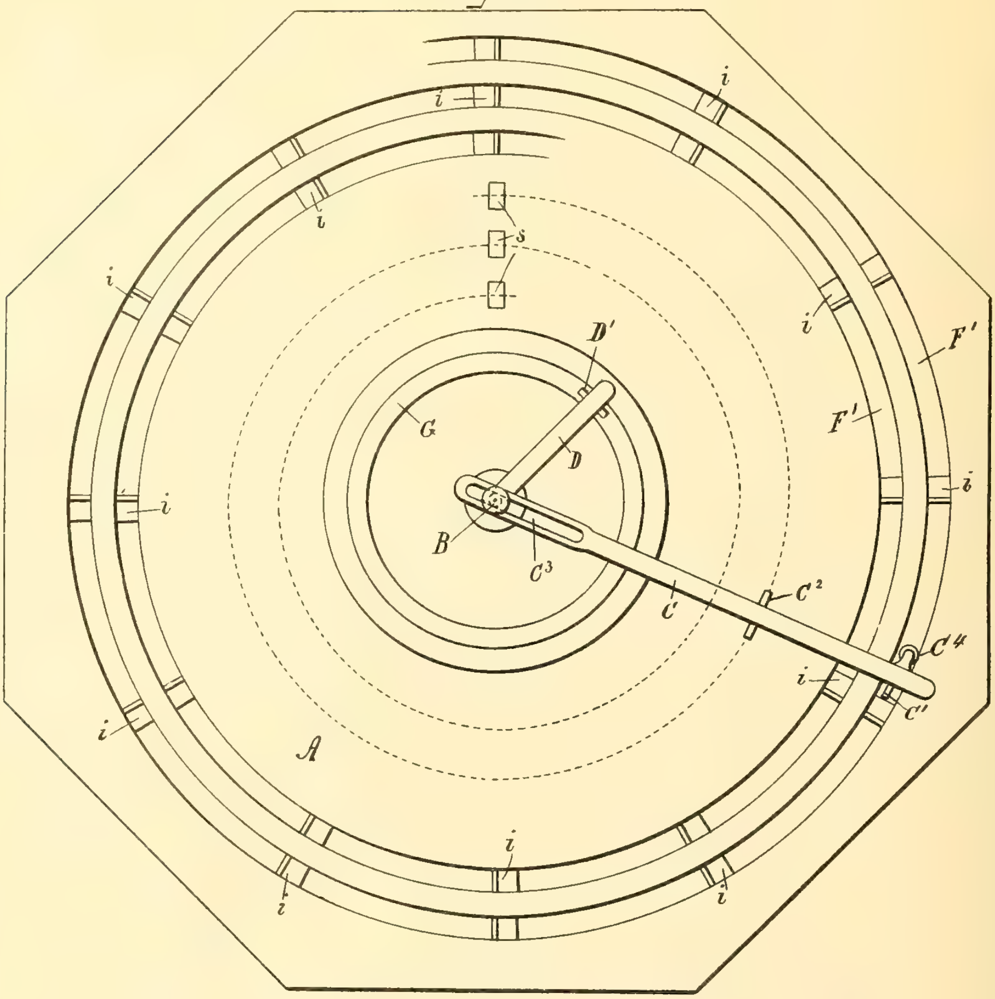


Fig. VII.

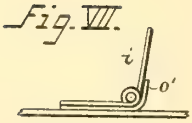
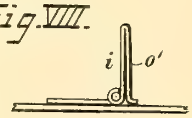


Fig. VIII.



WITNESSES:

James W. Frost

R. Klein Roshende

INVENTOR

John. Jacobi

UNITED STATES PATENT OFFICE.

JOHN JACOBI, OF BROOKLYN, NEW YORK.

ELECTRIC TIME-ALARM.

SPECIFICATION forming part of Letters Patent No. 478,865, dated July 12, 1892.

Application filed November 17, 1891. Serial No. 412,122. (No model.)

To all whom it may concern:

Be it known that I, JOHN JACOBI, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Automatic Circuit-Closers, of which the following, taken in connection with the accompanying drawings, is a full, clear, and accurate description.

My invention relates to that class of instruments in which one or both hands of a clock are utilized for effecting the closure of an electric circuit, causing such operation to be performed automatically and at fixed intervals of time.

The instrument embodying my invention is designed for use particularly at the termini of street-railways as a car-starter—that is to say, for automatically working a signal indicating the periods at which the cars are to be started; but it is also adapted to other general uses as a circuit-closer.

The novel features of my instrument and the advantage arising therefrom are hereinafter fully described, with reference to the accompanying drawings, in which—

Figure I represents a face view with the contact-points in a circular plane. Fig. II represents a partial side view and partial cross-section. Fig. III represents a detail side view of the contact-points. Fig. IV represents an end view of the hour-hand. Fig. V represents a like view of the minute-hand. Fig. VI represents a face view with the contact-points in a spiral plane. Fig. VII represents a side view of a modification.

Similar letters of reference indicate similar parts.

The letter A indicates the face of a clock, and B the center staff thereof geared with clock-movement in the usual way.

C indicates the minute-hand, and D the hour-hand, both mounted on the center staff B where it projects through the clock-face.

Upon the clock-face A is a row or series of adjustable contact-points i, which may extend in the circular plane shown in Fig. I or in the spiral plane shown in Fig. VI around the center staff B, and each of which consists of a metallic flap hinged radially in relation to the axis of the staff, so as to be capable of swinging in a direction parallel to said plane of the series from a lower to a raised position approximately at a right angle to the clock-face, or vice versa. The location of said radially-hinged flaps i is at fixed intervals, each representing a certain predetermined limit of time, which may be five minutes, as in the example shown in Fig. I, and for convenience of ascertaining the time so represented the clock-face A is usually marked with suitable figures opposite the flaps. The immediate support for the hinged flaps i is a metallic rail F, which is shaped to conform with the desired circular or spiral plane and properly secured to the clock-face A, this rail forming a means common to the series of flaps for connecting them with one pole of a battery. In the example shown in Fig. I the supporting-rail F is ring-shaped, and at a point within it on the clock-face is a second or auxiliary rail G, also ring-shaped, forming a means to connect the clock-hand C (being the minute-hand) with the other pole of the battery, as presently explained.

At a point opposite the auxiliary-rail G, on the hand D, is a contact D′, in form of a roller, which permanently engages said rail, while at a point opposite the flap-supporting rail F, on the hand C, is mounted a contact C′, in form of a spring, which in practice engages those of the series of flaps i which are in raised position, this spring-contact being properly graduated for that purpose, and in order to retain the flaps in a raised or operative position each is provided with a stop o, which may consist of a lug on the supporting-rail F, as more clearly shown in Fig. III, or an offset upon the flaps, as shown in Fig. VII, the effect of the stops being to resist a displacement of the raised flaps by the spring-contact C′ in the motion thereof together with the clock-hand.

When the instrument is applied to use, the rails F G are suitably wired to the respective poles of a battery and the desired flaps i are set to a raised position, leaving the remainder thereof in a lower position, reference being had to the times at which the circuit is to be closed—as, for example, when the circuit is to be closed at intervals of five minutes, the flaps are raised opposite the figures "5, 10, 15," and so on. Now in the motion of the hand C its spring-contact C′ is brought into en-

gagement with each of the raised flaps i and by this means the circuit is closed through the clock-hands C D, one of the flaps, and the two rails F G, so that if a signal or other apparatus is properly arranged in such circuit it may be automatically operated at desired intervals of time. If the auxiliary-rail G is omitted, the connection from the battery may be with the center staff B to the proper hand.

By the arrangement of the series of flaps i in a spiral plane, as shown in Fig. VII, a comparatively large and indefinite number thereof may be employed, thereby increasing the capacity of the instrument, and for the purpose of adapting the spring-contact C′ thereto the clock-hand C has a slot C^3, fitted on the center staff B, and also a roller C^4 or other suitable device engaging a guideway, formed in this example by one edge of a spiral groove F′, containing the flap-supporting rail, so that said hand is capable of sliding longitudinally on the staff, while by the action of said guideway upon the hand the spring-contact is automatically adjusted in relation to the spiral plane of the flaps, the hand being in practice re-adjusted to an inner position when said contact has traversed the plane of the flaps. It will be seen that by forming the contact-points of the hinged flaps they possess the advantage of permanent fixture to the instrument, so as to obviate a loss or misplacement thereof while affording a maximum ease and facility of adjustment.

If desired, a fixed contact point or points s may be applied to the clock-face for engaging with a contact C^2, as a roller, of the hands C, so as to close a circuit in each revolution of said hand, as once in each hour.

What I claim as new, and desire to secure by Letters Patent, is—

1. A circuit-closer in which are combined the clock, radially-hinged metallic flaps at fixed intervals around the center staff of the clock, a stop to each of said flaps for retaining it in raised or operative position, a clock-hand having the spring-contact to engage those of the series of flaps which are in operative position, and a means for connecting the flaps and clock-hand, respectively, with either pole of a battery, substantially as and for the purpose herein described.

2. A circuit-closer in which are combined a clock, radially-hinged metallic flaps at fixed intervals around the center staff of the clock, a metallic rail on the clock-face supporting said flaps to connect the series thereof with one pole of a battery, a stop to each of the flaps for retaining it in raised or operative position, a clock-hand having the spring-contact to engage those of the flaps which are in operative position, and a means for connecting said clock-hand with the other pole of the battery, substantially as and for the purpose herein described.

In testimony whereof I have set my hand this 16th day of July, 1891.

JOHN JACOBI.

Witnesses:
LOUIS W. FROST,
CHARLES G. COE.

(No Model.)

J. & A. MENEGAY.

WATCH CASE SPRING.

No. 479,292. Patented July 19, 1892.

Fig 1.

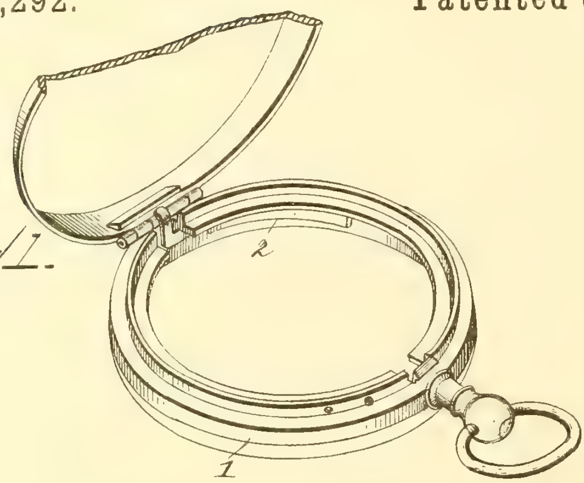


Fig 2.

Fig 3.

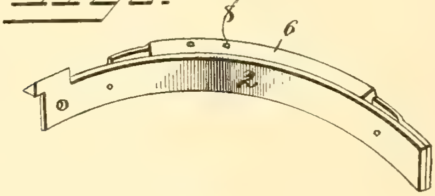


Fig 4.

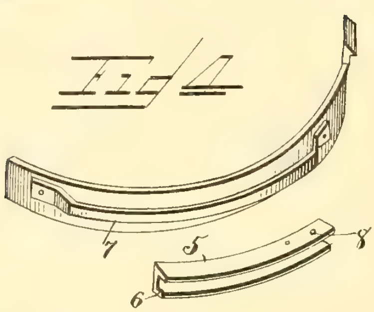
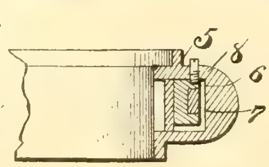


Fig 5.

Fig 6.



WITNESSES:

F. L. Ourand.

W. L. Coombs

INVENTORS:

Jules Menegay. and

Armand Menegay,

by Louis Bagger & Co

Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JULES MENEGAY AND ARMAND MENEGAY, OF BROOKLYN, NEW YORK.

WATCH-CASE SPRING.

SPECIFICATION forming part of Letters Patent No. 479,292, dated July 19, 1892.

Application filed March 5, 1892. Serial No. 423,895. (No model.)

To all whom it may concern:

Be it known that we, JULES MENEGAY and ARMAND MENEGAY, both residents of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Watch-Case Springs; and we do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to improvements in watch-case springs, the object being to provide an improved construction of the same whereby we obtain superior advantages with respect to ease and facility by which the same may be inserted in and fastened to the case and efficiency in use, whereby the spring may be lengthened or shortened and its tension thereby regulated.

The invention consists in the novel construction and combination of parts hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a watch-case with our improved spring applied thereto. Fig. 2 is a perspective view, on an enlarged scale, of the spring detached. Fig. 3 is a similar view, looking from the opposite side. Fig. 4 is a perspective view of the spring and holder. Fig. 5 is a cross-section through the rim of the case and spring, and Fig. 6 is a detail sectional view.

In the said drawings the reference-numeral 1 designates a watch-case having the usual recess to receive the spring.

The numeral 2 denotes the spring, consisting of an arc-shaped strip of metal having a blade 3 with a head 4. So far the spring may be of any ordinary or suitable construction. Located upon the outer or convex side of the spring is a holder 5, consisting of a metal plate corresponding in curvature to the spring and provided with a groove 6, running from end to end thereof, in which is seated a metal strip 7, secured at each end by means of rivets or screws to the spring. This strip should bear upon the holder with sufficient pressure to prevent accidental movement of the holder, yet permit the latter to be readily slid upon the spring when desired. The holder is provided with a series of screw-holes 8 to receive the securing-screws, by which it is attached to the case.

In practice the holder is adjusted upon the spring until the blade is of the desired length, and is then inserted in the recess in the case and secured therein by the retaining-screw passing through one of the holes therein, as will be readily understood by those skilled in the art.

From the above it will be seen that the holder can be readily secured to any ordinary watch-case, and by sliding the same back and forth upon the spring the length of the blade may be increased or diminished and the tension regulated.

The spring is to be made of tempered steel, as well as the holder and the securing-strip by which the holder is connected with the spring.

The invention will be of great advantage to jobbers, owing to the ease and facility with which it can be adjusted and fitted to the case.

The device may be used as a locking-spring to retain the lid in position when closed and also as a lifting-spring for causing the lid to fly open when the stem is pushed in. In the latter case the blade should be made tapering, as usual.

Having thus described our invention, what we claim is—

1. A spring for watch-cases, consisting of the arc-shaped metal strip having the blade and head, the movable or slidable holder resting upon said strip, having a groove running from end to end and provided with holes to receive a retaining-screw, and the securing-strip resting in said groove and having its ends secured to said spring, substantially as described.

2. The combination, with a watch-case, of the movable or slidable holder having a groove running from end to end and a series

of screw-holes, the retaining-screws by which the holder is fastened to the case, the spring upon which the holder rests, and the securing-strip resting in said groove in the holder and having its ends secured to the spring, substantially as described.

In testimony that we claim the foregoing as our own we have hereunto affixed our signatures in presence of two witnesses.

JULES MENEGAY.
ARMAND MENEGAY.

Witnesses:
HENRY ROESSLE,
CLARENCE B. KAUFMANN.

(No Model.)

G. Q. SEAMAN.
TIME ALARM BED.

No. 479,307. Patented July 19, 1892.

Fig 1

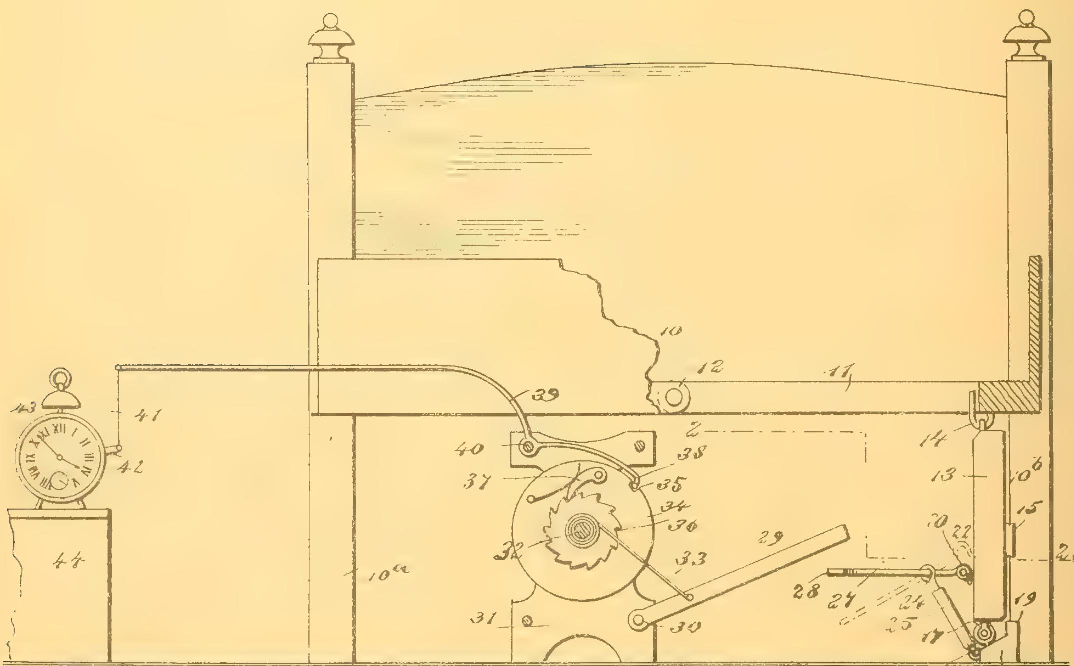


Fig 2

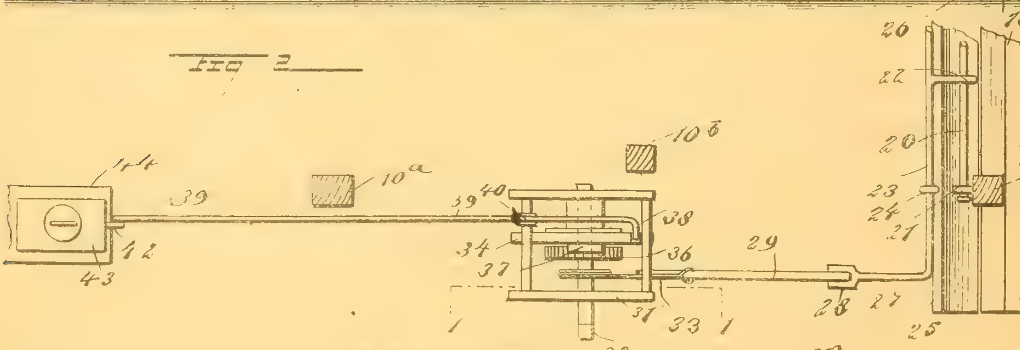
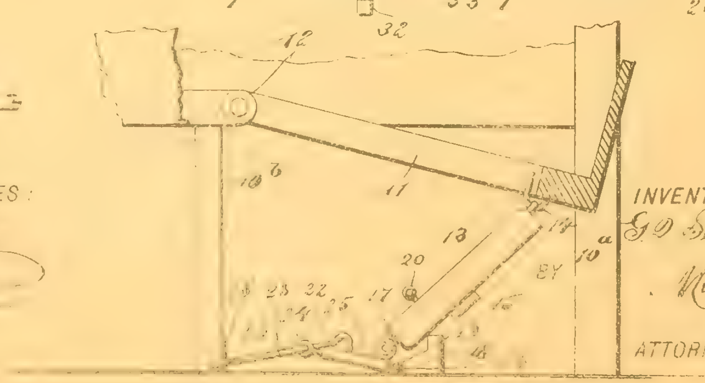


Fig 3



WITNESSES:
H. Walker
C. Sedgwick

INVENTOR
G. Q. Seaman
BY
Munn & Co
ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE Q. SEAMAN, OF BROOKLYN, NEW YORK.

TIME-ALARM BED.

SPECIFICATION forming part of Letters Patent No. 479,307, dated July 19, 1892.

Application filed March 22, 1892. Serial No. 425,938. (No model.)

To all whom it may concern.

Be it known that I, GEORGE Q. SEAMAN, of Brooklyn, in the county of Kings and State of New York, have invented a new and Improved Alarm-Bed, of which the following is a full, clear, and exact description.

My invention relates to improvements in alarm-beds and attachments therefor. It is well known that the ordinary alarm-clock often fails of its purpose in waking people or at least in compelling them to get up; and the object of my invention is to produce a bed and attachments therefor which will overcome this difficulty and which at any required time will actually eject the occupant of the bed, so that the said occupant will not only be awakened, but must necessarily arise.

To this end my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a broken end view, partly in section, of a bed, showing my improvement and the clockwork mechanism for operating the same. Fig. 2 is a sectional plan on the line 2 2 in Fig. 1, and Fig. 3 is a broken cross-section of the bed, showing it in position to drop and eject the occupant.

The bedstead 10 may be of any approved construction, and is mounted upon side legs 10^a and middle legs 10^b, and one side of the bed-bottom 11 is hinged near the center of the bed, as shown at 12 in Fig. 1, so that it may swing downward, and this movable portion of the bed-bottom is supported on loose legs 13, which at the top are secured to hooks 14, which are secured to the swinging-leaf portion 11 of the bed-bottom. The legs 13 are connected by a cross-brace 15 and they are provided at the bottom with rollers 17, which enable them to swing easily when necessary. The rollers 17 rest normally upon a floor-cleat 18, which extends longitudinally beneath the bed and which is inclined inward on its inner side, so that the rollers will have a tendency to roll inward, and the cleat has a vertical projection 19 at the top of the inclined surface, this projection limiting the outward swing of the loose legs 13.

A rod 20 is secured on the inner side of the loose legs 13, being held in keepers 21 or their equivalents, and this rod is adapted to engage a hook 22, which projects laterally from a rod 23, which rod extends longitudinally beneath the bed and parallel with the rod 20, the rod 23 being journaled in keepers 24, which are secured to the upper edge of a swinging leaf 25, this leaf being hinged to the inner lower edge of the cleat 18, as shown at 26.

It will be seen that when the legs 13 are in a vertical position the leaf 25 may be turned up and the hook 22 made to engage the rod 20, and the leaf will be held in a raised position and will serve as a brace to hold the legs 13 from swinging inward.

At one end the rod 23 is bent inward to form a crank 27, which terminates in a plate 28, this being arranged in the path of a swinging lever 29, which is pivoted at one end, as shown at 30, to a frame 31, arranged beneath one end of the bed. A rod 32 is journaled in the frame 31 and is held parallel with the rods 20 and 23, and secured to this rod or shaft 32 is a cord or wire 33, the outer end of the cord being fixed to the end of the lever 29. The shaft 32 has one squared end, as shown in Fig. 2, so that it may be wound up with a key, and by winding the shaft and the cord 33 thereon the lever 29 will be raised, and when the shaft is released the lever will drop of its own weight.

A tripping-disk 34 is journaled loosely on the shaft 32 and is provided in its edge with a notch 35, adapted to engage a tripping-lever, as described below, and fixed to the shaft on one side of the tripping-disk is a ratchet-wheel 36, which is engaged by a spring-pressed pawl 37, pivoted on the disk, and the pawl prevents the shaft from turning in relation to the disk when the disk is held in a fixed position. The disk 34 is prevented from turning by the bent end 38 of a lever 39, which enters the notch 35 in the disk, and the lever is pivoted, as shown at 40, to the upper portion of the frame 31. The lever 39 extends

outward beyond one edge of the bed, and its free end is connected by means of a cord or wire 41 with the lever 42, which is secured to the alarm-spindle of a common alarm-clock 43, which may be arranged upon a convenient stand 44.

The operation of the bed and the mechanism is as follows: The alarm-clock is set in the usual way at the time at which the occupant of the bed wishes to rise. The clock is connected with the lever 39, as described. The lever 39 is connected with the disk 34 to prevent that from turning. The shaft 32 is wound up so as to hold the lever 29 in a raised position, as shown in Fig. 1, and the leaf 25 is fastened up by the hook 22 so as to hold the loose legs 13 in a vertical position, and they will support the bed bottom or leaf 11 so that it will be perfectly level. The occupant of the bed need not have any concern about being awakened, as he may sleep calmly on without listening for the alarm; but at the time at which the alarm is set the downward movement of the lever 42 tilts the lever 39, which releases the disk 34, and permits the disk, the ratchet-wheel, and the shaft 32 to unwind, and the lever 29, striking on the free end of the crank 27, tilts the rod 23, thus permitting the leaf 25 to drop, and the legs 13 run inward beneath the bed, the leaf 11 swings inward, and the occupant is spilled upon the floor. It will thus be seen that there is no possibility of his oversleeping.

It will be noticed that the leaf 11 of the bed-bottom is hinged near the center of the bed, and so, if there are two occupants of the bed, one may be thrown out without in any way disturbing the other; but in single beds the whole bottom may be made to drop in the manner described.

If necessary or desirable, two alarm-clocks may be used instead of one and connected with the lever 39, so that in case one clock stops the other will perform its duty.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with the bed, the swinging bottom, the loose legs for supporting the bottom, and the lever mechanism for fastening the legs, of a clockwork mechanism adapted to release the lever mechanism and trip the legs, substantially as described.

2. The combination, with the swinging bed-bottom and its supporting-legs, of an inclined cleat forming a rest for the legs, a swinging leaf hinged to the cleat, a crank-rod carried by the leaf and adapted to be fastened to the legs, and a clockwork-operated tripping-lever adapted to swing against the crank, substantially as described.

3. The combination, with the swinging bed-bottom and its supporting-legs, of an inclined support for the legs, a rod connecting the two legs, a swinging leaf hinged to the inclined support, a crank-rod journaled on the leaf and having a hook to engage the leg-rod, a swinging lever adapted to strike on the crank of the crank-rod, and a clockwork mechanism for releasing the lever, substantially as described.

4. The combination, with the swinging bed-bottom and its supporting-legs, of an inclined support for the legs, a fastening device to hold the legs to the support, a swinging crank-arm adapted to release the fastening device, a swinging lever adapted to strike the crank-arm, and a clockwork mechanism for releasing the lever, substantially as described.

GEORGE Q. SEAMAN.

Witnesses:
GEO. GOODWIN,
ROBERT K. BRYERS.

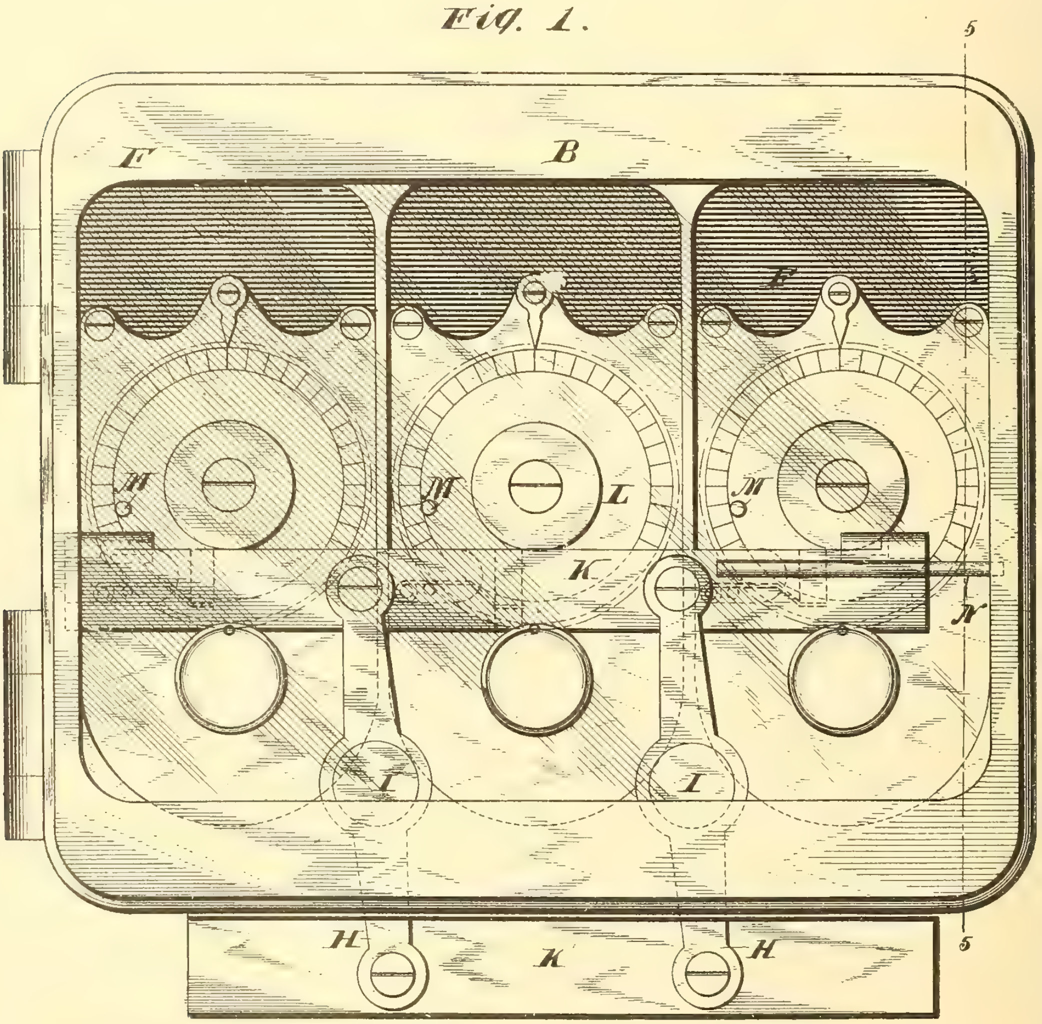
(No Model.) 5 Sheets—Sheet 1.

E. & H. C. STOCKWELL.

TIME LOCK MECHANISM.

No. 479,379. Patented July 19, 1892.

Fig. 1.



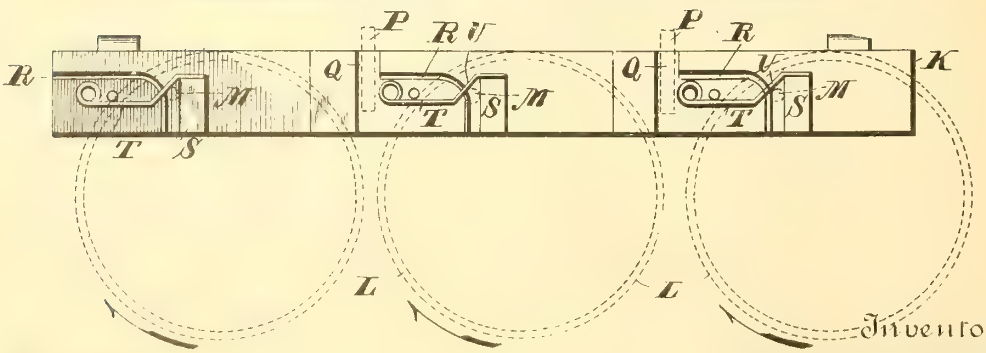


Fig. 11.

Witnesses
Louis G. Julihn.
Eric G. Julihn

Inventors
E. and H. C. Stockwell.
By Hopkins & Atkins
Attorneys

(No Model.) 5 Sheets—Sheet 2.

E. & H. C. STOCKWELL.

TIME LOCK MECHANISM.

No. 479,379. Patented July 19, 1892.

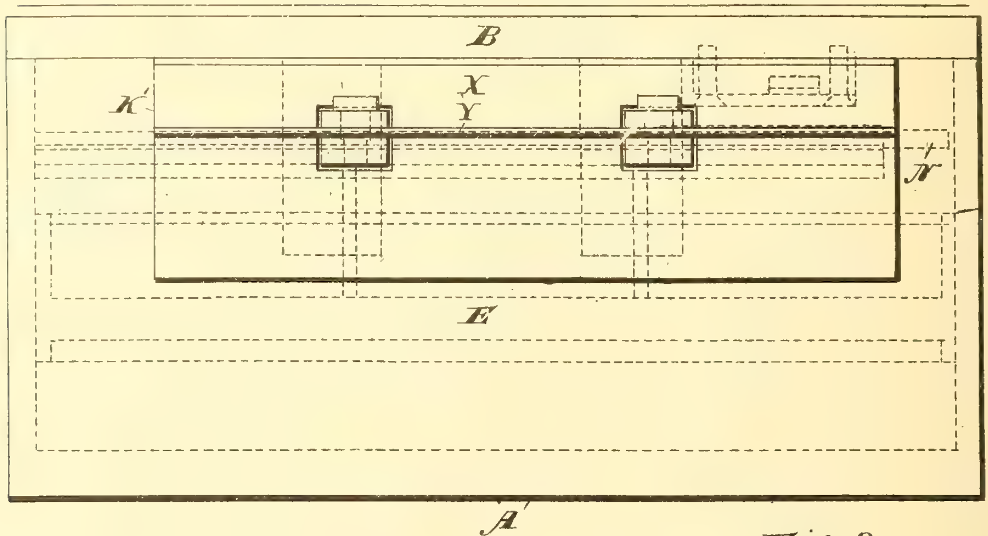


Fig. 2.

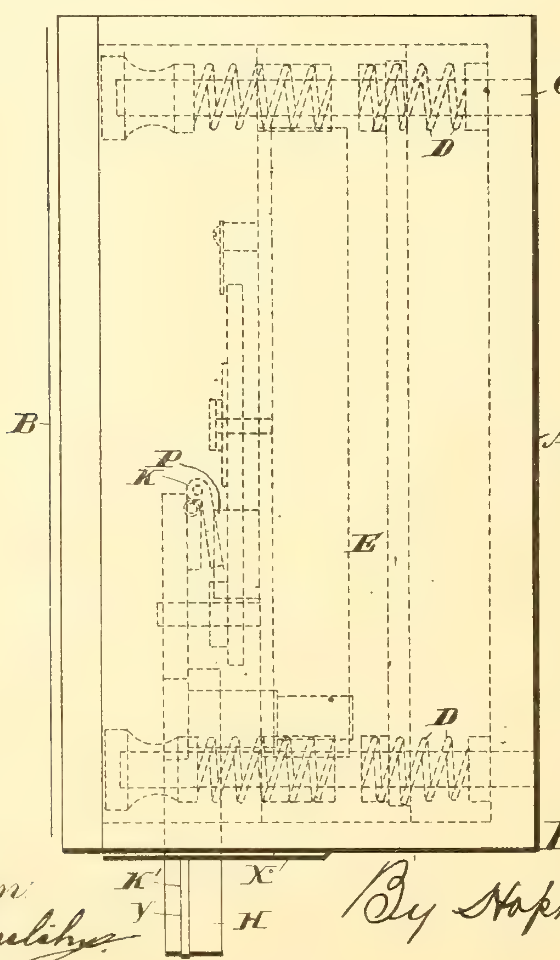


Fig. 3.

Witnesses
Louis G. Julihn
Eric G. Julihn

Inventors
E. and H. C. Stockwell
By Hopkins & Atkins
Attorneys

THE NORRIS PETERS CO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 3.

E. & H. C. STOCKWELL.

TIME LOCK MECHANISM.

No. 479,379. Patented July 19, 1892.

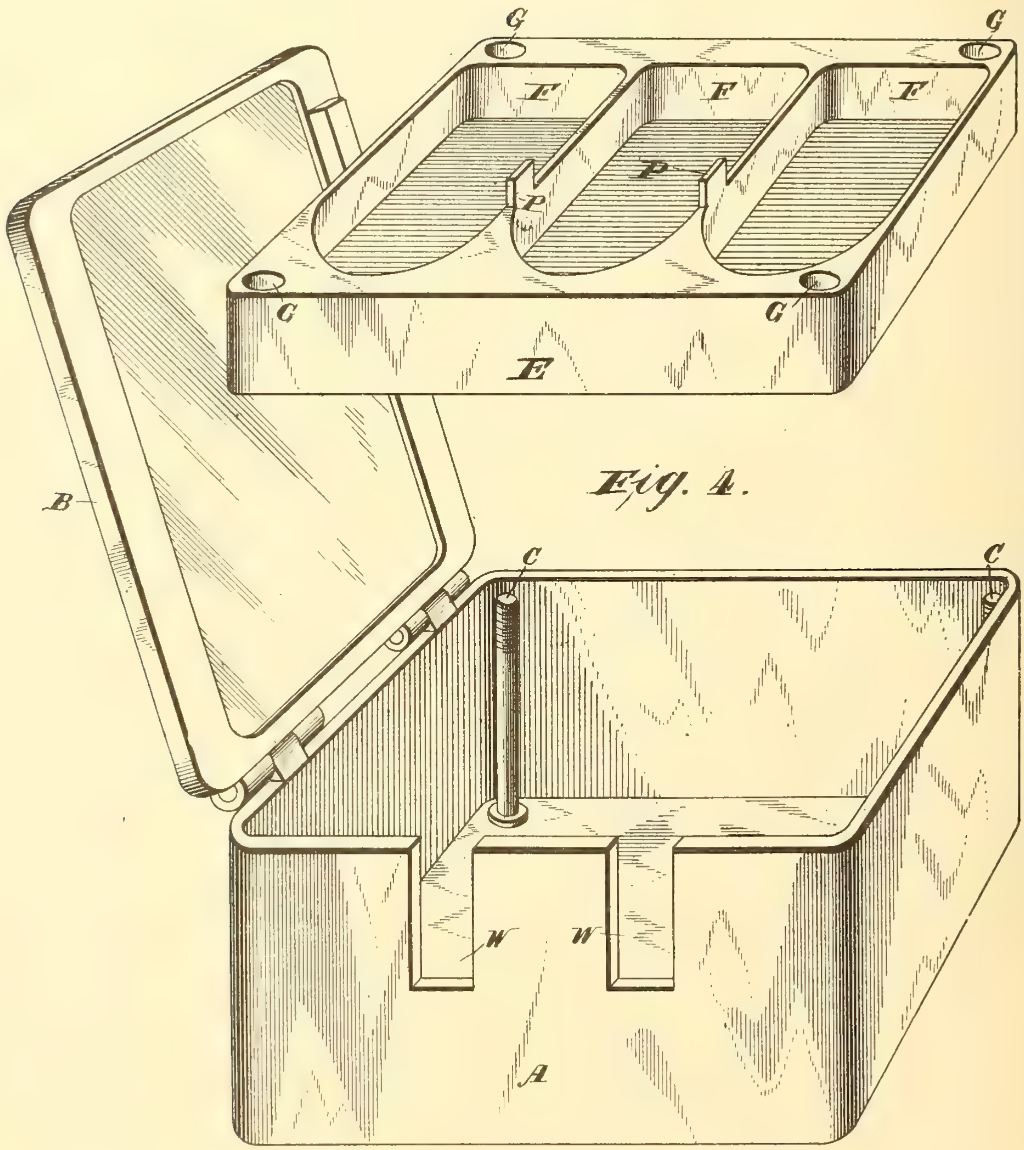


Fig. 4.

Witnesses

Louis G. Julihn.

Epr. G. Julihn

Inventors

E. and H. C. Stockwell.

By Hopkins & Atkins

Attorneys

THE NORRIS PETERS CO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 4.

E. & H. C. STOCKWELL.

TIME LOCK MECHANISM.

No. 479.379. Patented July 19, 1892.

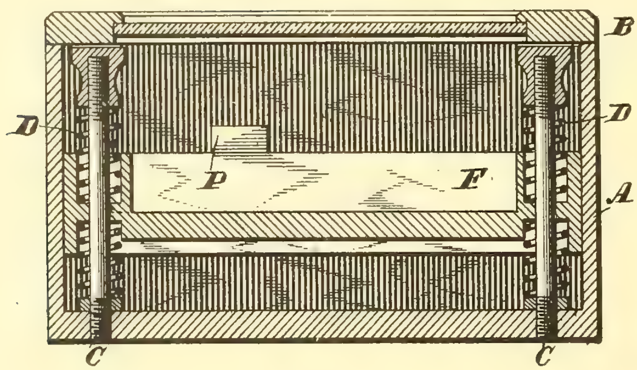


Fig. 5.

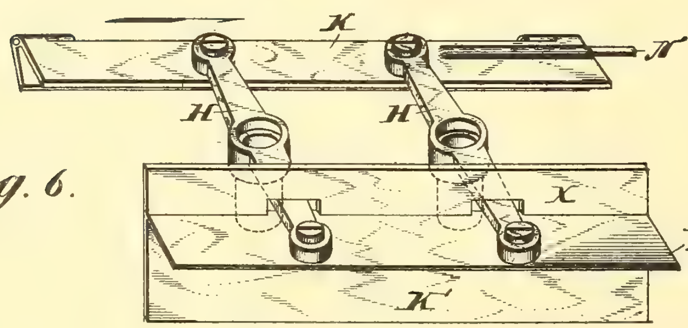


Fig. 6.

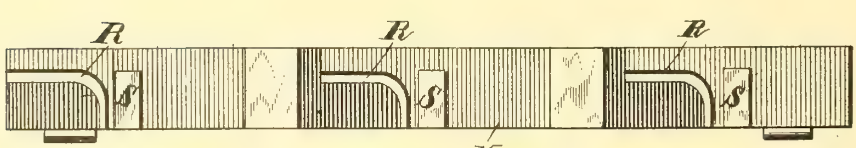


Fig. 8.

Fig. 13.

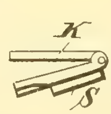


Fig. 9.

Witnesses
Louis G. Julihn.
Eric G. Julihn

Inventors
E. & H. C. Stockwell.
By Hopkins & Atkins
Attorneys

THE NORRIS PETERS CO., WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 5.

E. & H. C. STOCKWELL.

TIME LOCK MECHANISM.

No. 479,379.

Patented July 19, 1892.

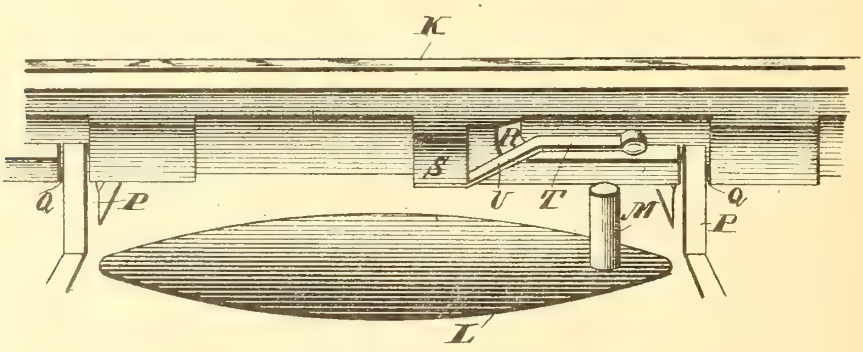


Fig. 7

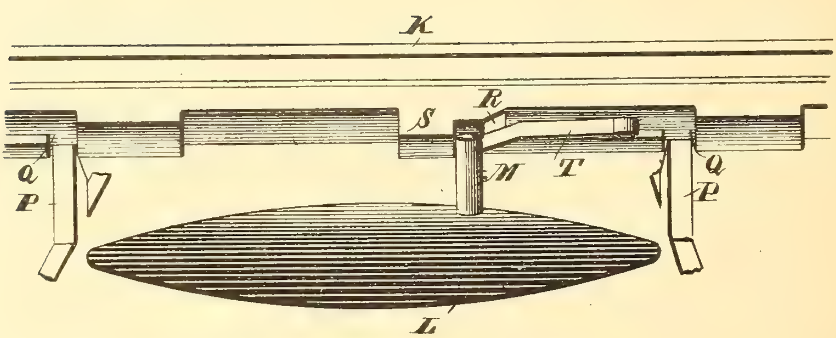


Fig. 12.

Fig. 10.

Witnesses

Louis G. Julihn.

Eric G. Julihn

Inventors

E. and H. C. Stockwell.

By Hopkins & Atkins

Attorneys

UNITED STATES PATENT OFFICE.

EMORY STOCKWELL AND HERBERT C. STOCKWELL, OF STAMFORD, CONNECTICUT, ASSIGNORS TO THE YALE & TOWNE MANUFACTURING COMPANY, OF SAME PLACE.

TIME-LOCK MECHANISM.

SPECIFICATION forming part of Letters Patent No. 479,379, dated July 19, 1892.

Application filed November 13, 1891. Serial No. 411,829. (No model.)

To all whom it may concern:

Be it known that we, EMORY STOCKWELL and HERBERT C. STOCKWELL, of Stamford, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Time-Lock Mechanisms, of which the following is a specification, reference being had to the accompanying drawings.

Our invention has for its object a lock designed to use a plurality of movements, the movements and connecting mechanism being so designed that any desired number of movements can be readily placed in one case, so as to be operatively connected with the dog for ordinary boltwork or with the tripping mechanism of an automatic bolt-operating device. The connecting mechanism between the time-movements and the device, whatever that may be, which is actuated thereby, is specially designed to avoid unnecessary friction, and further, so that the lock cannot be opened by jarring nor by tilting or overturning the safe.

In view of the great increase in the security of safes and the difficulty of opening them, especially when a bolt-operating device is used, so that there is no spindle or other hole through the door, it is especially desirable that every possible precaution against lock-out and derangement of the locking mechanism should be taken, and still more that the mechanism should not be liable to be jarred open in any manner. Our lock has also the important advantages that all the locking mechanism and connecting mechanism is mounted upon a block or frame, and this block is placed in a case and mounted upon springs or cushions, so that the entire mechanism of the lock may be said to be floating with reference to the door. Therefore no jar or concussion upon the door will in any wise derange the mechanism unless the concussion is sufficient to practically destroy the door. In our construction the case acts simply as a protection against dirt and against interference with the operation of the mechanism by attack or by contact with any foreign substance or with the contents of the safe. The case merely covers and supports the mechanism on the cushion-studs. A preferable construction is to provide a solid block in which recesses are formed, said recesses being as deep as the time-movements are thick, so that when the latter are in place they will be flush with the front face of the block and fit in the recesses in the block accurately; but instead of the block suitable framework may be used, this particular detail of construction not being essential to our invention.

An important practical advantage which arises from our construction is that, inasmuch as all the time and connecting mechanism is attached to said block or frame, all of this mechanism can be removed bodily from the case by unscrewing the four corner-screws, and after the lock-case has been attached to the door the time and connecting mechanism can be as readily replaced. In former constructions where it has been necessary to disconnect some of the mechanism before the movements could be taken out and the case attached to the door there has been more or less danger that the mechanism in unskillful hands would become disarranged; but our construction practically obviates this danger.

Broadly speaking, the intermediate connecting or unlocking mechanism consists of two bars, preferably parallel, which are carried by levers pivoted to the block. The upper bar is actuated by the time-movements, or any one of them, and its motion causes the parallel motion of the other bar, which in turn actuates a dog or tripping device, as the case may be. This intermediate mechanism is balanced with reference to the screws or studs, upon which it is pivoted on the block, so that a jar or overturning of the safe will not tend to cause motion of the unlocking-bar, and thus prematurely unlock the safe.

In addition to the protection which the balanced mechanism gives against premature unlocking, we use a light spring, which tends to hold the mechanism in the locked position, this spring not being strong enough to interfere with the operation of the time-movements in any way, but being an absolute preventative against premature unlocking by jarring or otherwise.

All the movements of the connecting mech-

anism are pivotal, as distinguished from sliding movements, so that the frictional resistance, and therefore the labor upon the time-movements, is lessened, and the liability of any obstruction causing the lock to stick is also reduced.

In view of the greatly-increased strength of modern safes and vaults, the desirability of providing against any trouble from lock-out owing to failure of the unlocking mechanism is correspondingly increased. Accordingly it is desirable, whenever possible, to duplicate the operating mechanism. We have provided double connections between the upper bar, which is actuated directly by the time-movements and the unlocking-bar. Connections of this sort sometimes fail from the backing out of a screw, and if only a single connection is provided such failure might be disastrous. The double connection which we have provided we therefore consider an important improvement; and a further advantage of our construction is that the considerable length of the lower bar allows great latitude in the position of the automatic bolt-operating device, which may be operatively connected with the lower bar at any convenient point without the interposition of any intermediate piece.

In the drawings, Figure 1 is a top plan view of the lock-case closed and showing its contents through its glazed covering. Fig. 2 is a front elevation of the same, with some of the interior parts dotted in. Fig. 3 is an end elevation of the same, showing some of the interior parts dotted in. Fig. 4 is a perspective view showing the block detached from the case, the case open, and the block in position as if about to be incased. Fig. 5 is a section on the line 5 5 in Fig. 1, drawn on a smaller scale. Fig. 6 shows a perspective view of the intermediate connecting mechanism detached. Fig. 7 is a perspective view of part of the primary unlocking-bar detached and its hinged part swung open. This figure also shows some of the connected parts. Fig. 8 is a plan view of the under side of the hinged part of the unlocking-bar. Fig. 9 is an end view of the unlocking-bar, showing the hinged part open and in the position it will occupy normally when the connected parts are in the locked position. Fig. 10 is a section, on a larger scale, of one end of one part of the unlocking-bar and the spring and spring-rod which it carries. Fig. 11 is a view of the under side of the hinged part of the unlocking-bar, showing springs attached to the bar and in dotted lines indicating connected parts. Fig. 12 is a view similar to Fig. 7, except showing the parts in different positions, the hinged part of the unlocking-bar being closed in this instance. Fig. 13 is a view of the primary unlocking-bar, viewed from the side on which its hinges are. This figure illustrates how the two parts of the unlocking-bar are bowed, so as to tend to spring apart.

Referring to the letters upon the drawings, A indicates an ordinary lock-case having a hinged cover B. This lock-case is provided with spring-studs C, upon which cushion springs D are placed on opposite sides of the block E when it is in position in the case, as well shown in Figs. 3 and 5, so that the block and all the mechanism secured to it is amply cushioned within the case front and back. The block E is provided with a series of recesses F for the reception of independent time-movements. It is also provided with holes G to receive the spring-studs C.

H H indicate levers pivoted to the block at I I and having pivoted on their opposite ends a primary unlocking-bar K and a secondary unlocking-bar K'.

L L L indicate three time-movements. (Shown in outline in Fig. 1 as in place within the recesses in the block.) Each one of these time-movements, which need not be described in detail, because they are not new, is provided, as usual, with a tripping-pin M, whose office is, when moved by the operation of the time mechanism, to operate the intermediate unlocking mechanism, so as to release boltwork. (Not illustrated.)

The primary unlocking-bar K is composed of two parts, the outside part being pivoted to the upper ends of the levers H H. This outside part is provided at one end with a spring-rod N, which bears against the lock-case, as shown in Fig. 1, and tends to prevent the bar K from moving in the direction for causing unlocking. The spring O of this rod is not strong enough to stop the operation of a single time-movement or to retard it, but is strong enough to prevent the movement by concussion of other abnormal means of the primary unlocking-bar and its pivotally-connected movable mechanism. The inner part of the primary unlocking-bar K is hinged to the outer part, as shown, and is provided on its inner face with a series of spring-stops, inclines, notches, and shoulders, each set of the series adapted to operate in connection with each time-movement and all being alike.

P indicates a projection from the block. Two of these projections are shown, and each has the same function, which is to normally engage with a notch in the hinged part of the bar K when the bar is in the locked position and to prevent it from moving to the unlocked position. To effect an engagement between these projections and the notches on the hinged part of the bar, we make the two parts of the bar of resilient metal and bend them in the middle slightly toward each other on their hinged edges, so that they will be bowed and impinge in the center, as shown in Fig. 9. This construction causes the hinged part to partly open by spring action, so that part will engage securely by its notches Q Q with the projections P. One of these notches and projections might be sufficient, but for greater security we employ two.

While the special construction of spring above described is very good, it is obvious

that the object could be accomplished by any spring which would tend to separate the two parts of the bar K.

R indicates an incline upon the inner surface of the hinged part of the bar K. This incline projects at one end across the path of the pin M. As the pin is moved in its curvilinear course by the time-movement it impinges by its outer end against the incline and gradually closes the hinged part of the bar K, and thus disengages it from the projections P. After it has been disengaged the pin M continues its course and impinges against a lug or rib S upon the hinged part, and gradually moves the bar K in the direction of the arrow, Fig. 6, and thus operates the intermediate tripping or unlocking mechanism by turning the levers H H on their pivots.

T indicates a spring or stop, which is secured to the hinged part of the bar K, and is provided with an inclined or angular part U.

If there were no provision such as the spring-rod N the intermediate mechanism might by some kind of shock be caused to move in the direction for unlocking faster than the pin M would propel it. In that event a depository might be prematurely opened. The spring-rod N tends to prevent this; but in addition to that provision for safety we employ the spring or stop T. The angular or inclined part of this stop stands opposite the pin M as soon as the pin has passed along the incline and impinged against the rib V, so that should any force be applied sufficient to prematurely move the bar K in the direction for unlocking the spring T would bear by its incline against the pin M and stop the movement of the bar, thus preventing unlocking until the time predetermined for the completion of the function of the time-lock.

The lock-case is provided with two openings W in its lower face, through which project the outer ends of the levers H H, to which the bar K′ is pivoted. The openings in the case are, as illustrated in Fig. 4, deep enough and wide enough to permit the free movement of the levers either on their pivots from side to side or forward and back, to accommodate any jar or shock that the lock might suffer. By providing these large openings in the shell the block E and all its attached parts can move without obstruction except by the cushions above described about as freely as if suspended, and every shock received will have the same effect as if received by one solid cushioned piece.

The bar K′ is made of such form as to completely cover the openings W in the lock-case. (See Figs. 1 and 6, where it is shown as substantially T-shaped, with openings in the covering part X for the levers H H to pass through, the levers being pivoted to the projecting part Y.)

What we claim is—

1. In a time-lock, a block or frame carrying the time-movements and the operative mechanism of the lock, in combination with a case, which is secured to the door and supports said block on cushioned studs, so that the entire operative mechanism is free to move with reference to the case and may be removed therefrom without derangement, substantially as set forth.

2. In a time-lock, the combination of time mechanism, a primary unlocking bar, a secondary unlocking-bar, pivotal connections between the two bars, and a dog or other device to be actuated or unlocked, the arrangement being that the time mechanism engages with the primary unlocking-bar, and said bar acts through the pivotal connections upon the secondary unlocking-bar, and the secondary unlocking-bar acts upon a dog or other device to be actuated, substantially as described.

3. In a time-lock, in combination with time mechanism, an unlocking-bar K, composed of two parts hinged together, provided with a spring tending to keep them apart, substantially as described.

4. In a time-lock, the combination of time mechanism and bars K K′, of the projections P, the bar K being composed of two parts and its hinged part being provided with notches for engagement with the projections, substantially as set forth.

5. In a time-lock, the combination, with time-movements, of the pin M, the primary unlocking-bar K, composed of two parts and provided with an incline R and with a lug or rib S, substantially as set forth.

6. In a time-lock, the combination, with the lock-case having openings with connecting mechanism and a secondary unlocking-bar adapted to cover said openings in the case, substantially as set forth.

7. In a time-lock, the combination, with time-movements and primary and secondary unlocking-bars K and K′, of pivoted connecting-levers between the bars and connecting the bars with the time-movements, substantially as set forth.

8. In a time-lock, the combination of a time-movement and a primary unlocking-bar, with which it engages, and a secondary unlocking-bar actuated by the primary bar, and two or more pivoted parallel connecting-levers supporting said bar, substantially as set forth.

9. In a time-lock, a primary unlocking-bar having a movable section and a rib or projection in the lock, with which such movable section tends to engage, whereby the bar cannot be moved in the direction for unlocking until the time-movements are properly operated, substantially as set forth.

10. In a time-lock, a block or frame held in place within the lock-case upon studs fastened to the inside of said case with cushion-springs both in front and rear of said block, said block being also provided with a plurality of recesses, each to receive separate self-contained movements, so that said block and the movements may be bodily removed from

the lock-case or each movement may be separately removed from said block, substantially as described.

11. In a time-lock, the combination of time mechanism, the primary and secondary unlocking-bars, and between said bars double connecting mechanism, so that upon the failure of any one connection the connection between the time-movements and the device to be unlocked is not severed, substantially as described.

12. In a time-lock, the combination, with time-movements and a device to be unlocked thereby, of balanced connecting mechanism between the time-movements and the device to be unlocked, substantially as described.

In testimony of all which we have hereunto subscribed our names.

EMORY STOCKWELL.
HERBERT C. STOCKWELL.

Witnesses:
SCHUYLER MERRITT,
GEO. E. WHITE.

(No Model.)

M. MACKELLAR & G. D. WEAVER.

ELECTRIC SELF WINDING CLOCK.

No. 479,520. Patented July 26, 1892.

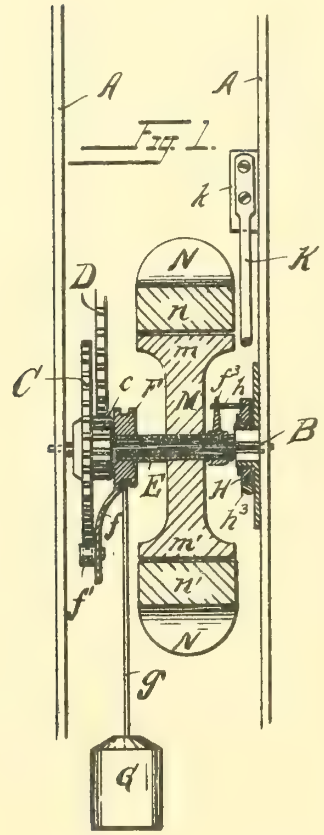


Fig. 1.

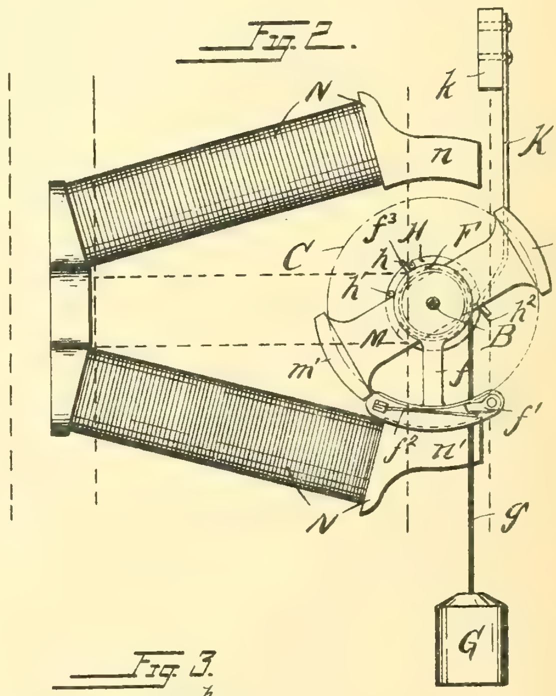


Fig. 2.

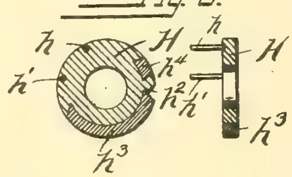


Fig. 3.

Witnesses

Ed. A. Kelly.

Caleb J. Bieber.

Malcolm MacKellar
George D. Weaver
} Inventors

By their Attorney

W. G. Stewart

UNITED STATES PATENT OFFICE.

MALCOLM MACKELLAR AND GEORGE D. WEAVER, OF READING, PENNSYLVANIA.

ELECTRIC SELF-WINDING CLOCK.

SPECIFICATION forming part of Letters Patent No. 479,520, dated July 26, 1892.

Application filed August 12, 1891. Serial No. 402,421. (No model.)

To all whom it may concern:

Be it known that we, MALCOLM MACKELLAR, a British subject, and GEORGE D. WEAVER, a citizen of the United States, residing at Reading, in the county of Berks, State of Pennsylvania, have invented certain Improvements in Electric Winding Mechanisms for Clocks, of which the following is a specification.

The main object of this invention is to provide an electric mechanism for automatically renewing the actuating-power of a clock at regular short intervals and with a minimum tax upon the battery and which at the same time will be simple and economical in construction and applicable without material change to ordinary clock-movements; also, to incur the least possible liability of getting out of order.

The invention is fully described in connection with the accompanying drawings, and is specificially pointed out in the claims.

Figure 1 is a side elevation, partly in section, and Fig. 2 a similar front elevation, of a portion of a clock mechanism with our automatic apparatus applied thereto. Fig. 3 is a separate view of the circuit-closer.

A A represent the front and rear frame-plates of a clock-movement, and B one of the fast-running arbors journaled at either end in said frame-plates and provided with a pinion c and a ratchet-wheel C, both of which are fixed on the arbor. The pinion c meshes with a wheel D of the clock-train. Loosely surrounding the arbor B is a sleeve E, to which is secured the pulley F, from which the actuating-weight G of the clock is suspended by means of a cord g. An arm f from the pulley carries a pawl f', which is pressed into engagement with the toothed edge of the ratchet-wheel C by means of a light spring f^2. An armature M is also rigidly secured to the sleeve E, with which it turns, thus swinging its opposite ends m and m' concentrically around the axis of the arbor.

N N represents an electro-magnet of horseshoe form, secured to the clock-frame and having its respective poles n and n' so arranged with respect to the armature M that the poles of the latter in swinging around the axis B will pass in close proximity to the poles of the magnet, but can never come in actual contact therewith.

A disk-shaped circuit-closer H is loosely mounted on a fixed sleeve on the bottom plate of the clock-frame, so as to turn around the axis of arbor B. A portion of its rim is insulated, as shown at h^3 and h^4, and a V-shaped notch h^2, terminating in the metal part of the disk, is provided to receive the contact-spring K in closing the circuit, as will be hereinafter described. The spring K is secured through the medium of an insulated block k to the bottom frame-plate of the clock. The circuit-closer is turned automatically by the sleeve E by means of a pin f^3, which projects radially from the latter and engages pins or projections h and h' on the face of the disk H, the latter pins being separated somewhat, however, so as to permit a limited movement of the sleeve and armature without moving the disk.

The connections are made between the electro-magnet and a suitable battery in such a manner that the circuit is open when the spring K rests upon the insulated portion of the circuit-closer disk H and closed when the same rests in the notch h^2, one wire from the magnet being connected to the clock-frame with which the contact-disk is in electrical connection, the other wire to the battery, and the spring K to the other battery-wire. The operation is then as follows: The weight G, through the medium of pulley F, pawl f', ratchet-wheel C, and pinion c, actuates the clock mechanism in the usual manner until the running down of the weight has turned the armature to about the position shown in Fig. 2. By this time the circuit-closer H has been turned by the sleeve-pin f^3 pushing upon the pin h so far that the V-shaped end k' of the spring K, which has been riding upon the insulated edge h^3, drops with a firm pressure, owing to the tension of the spring from the latter into the notch h^2, thus closing the circuit and insuring very little resistance at the contact-point. The armature instantaneously turns in the field of the magnet, thus winding up the weight G and moving the pawl f' around the ratchet-wheel to a new point of engagement. As the armature

turns toward the magnet-poles the circuit-closer remains stationary, with the contact-spring K firmly pressed on the metal part of the notch, thus maintaining the current and the resulting pull upon the armature, while the sleeve-pin f^3 moves around into contact with the disk-pin h', which it touches slightly before the armature has reached its central position between the poles of the magnet. The movement of the circuit-closer, when the swinging armature brings the sleeve-pin f^3 in contact with the disk-pin h, immediately lifts the end k' of the spring K onto the insulating-rim h^3, thus opening the circuit and permitting the momentum of the armature to carry its ends past the magnet-poles until all its stored energy has been utilized in raising up the actuating-weight.

The insulating portion h^4 of the rim of the circuit-closer acts as a safety cut-off for the battery when the latter has run down, so as to be incapable of magnetizing sufficiently to turn the armature and raise the weight. In such case the continued descent of the weight turns the circuit-closer beyond its normal limit of movement, thus lifting the end k' of the contact-spring K onto the insulating portion h^4 and reopening the circuit, in which condition it will remain when the clock stops, and the battery will thus be untaxed until renewed. As we have applied our invention this automatic raising of the actuating-weight takes place in about every five minutes; but the interval may evidently be varied as desired. The use of the battery is only momentary, although the current, as already explained, is maintained during a considerable portion of the armature movement instead of being cut off as soon as it starts moving, as is the case with an ordinary make-and-break contact. The peculiar form and arrangement of the armature and magnet also avoids any strain or wear upon the supporting-arbor. There is no objectionable shock or noise produced by the action, inasmuch as all the energy developed is taken up in raising the actuating-weight instead of being lost in a sudden stoppage against the magnet-poles. The turning of the armature beyond the magnet-poles, due to the momentum acquired while attracted in the field of the magnet, more than doubles the effect of the battery-power used, besides preventing all objectionable shock or noise.

The mechanism is simple, compact, and inexpensive, and is applicable and easily attached to ordinary clock-movements without necessitating any material change in them.

Having thus described our invention, we do not purpose limiting ourselves to the exact construction shown; but

What we claim is—

1. In an electric actuating mechanism for clocks, the combination, with the clock-train and the electro-magnet, of the oscillating armature loosely mounted upon one of the train-arbors and attached directly to the actuating-weight and through a pawl-and-ratchet connection to the clock-train, and means for automatically making and breaking the circuit, all arranged and adapted to operate substantially as set forth.

2. The combination, with a clock-movement, of an electric actuating mechanism consisting of electro-magnet N N, armature M, carrying pulley F and pawl f' and loosely mounted on the arbor of ratchet-wheel C, circuit-closer H, with projections h and h' engaging a projection of the armature, as described, and a contact-spring K, all arranged and adapted to operate substantially as set forth.

3. In an electric actuating mechanism, substantially as described, the circuit-closer H, having insulations h^3 and h^4 with intermediate contact-surface h^2, in combination with the contact-spring K and means for automatically moving the circuit-closer, substantially as and for the purpose set forth.

4. In an electric actuating mechanism, substantially as described, the circuit-closer H, having a notch h^2 depressed below the insulated face of the circuit-closer, in combination with a contact-spring having an end k' adapted to firmly engage said notch, whereby perfect contact is secured and the movement of the circuit-closer retarded.

In testimony whereof we affix our signatures in presence of two witnesses.

MALCOLM MACKELLAR.
GEORGE D. WEAVER.

Witnesses:
E. C. JEMBOWER,
FRANK TYACK.

(No Model.) 2 Sheets—Sheet 1.

F. WELLEBA, Sr., F. WELLEBA, Jr. & L. WÄCHTER.

ADVERTISING CLOCK.

No. 479,687. Patented July 26, 1892.

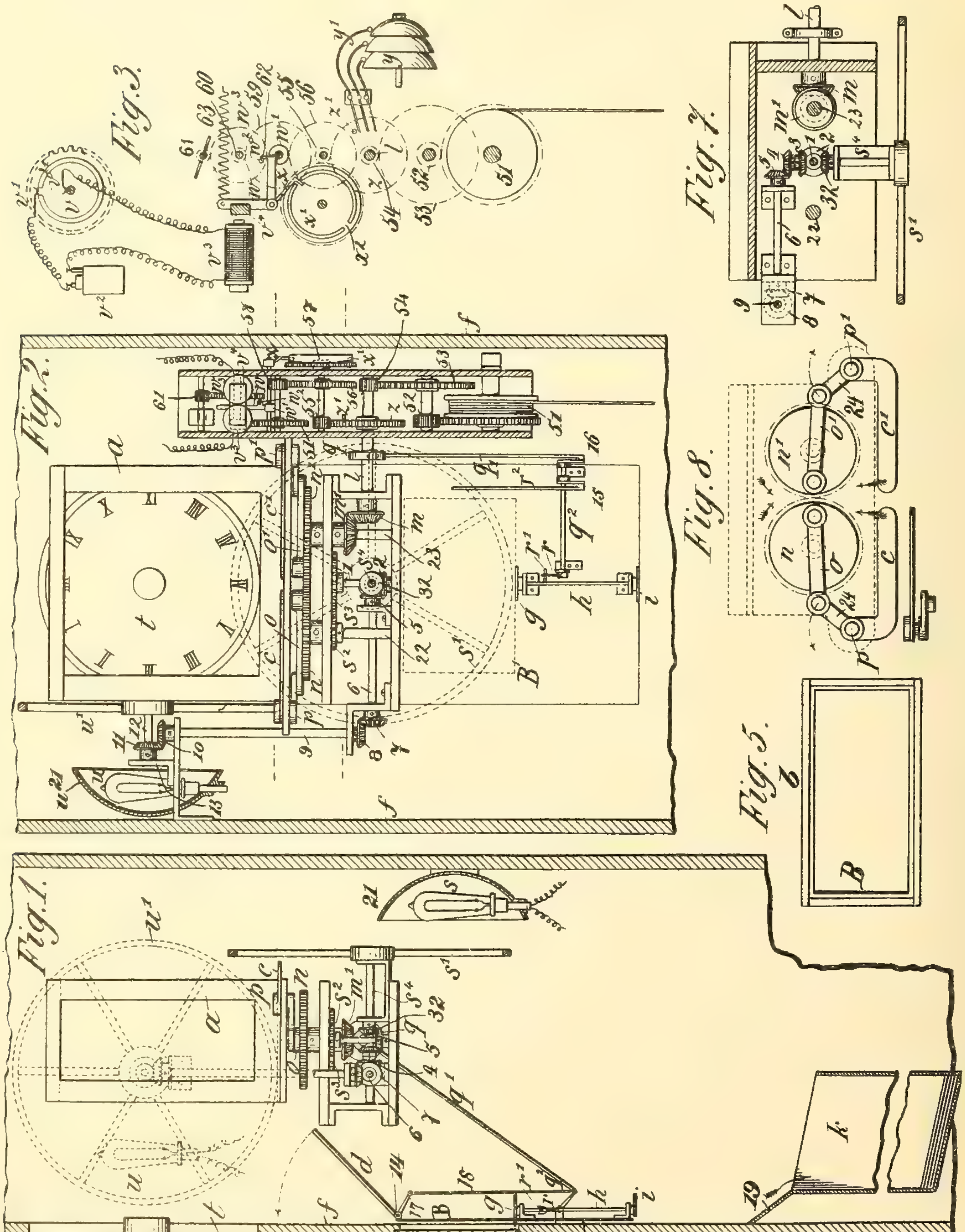
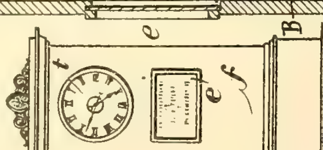


Fig. 4.



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Inventors:
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Franz Welleba, Jun.
Ludwig Wächter.
by Henry Orth
Atty:

(No Model.) 2 Sheets—Sheet 2.

F. WELLEBA, Sr., F. WELLEBA, Jr. & L. WÄCHTER.

ADVERTISING CLOCK.

No. 479,687. Patented July 26, 1892.

Fig:6.

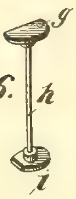


Fig:9.

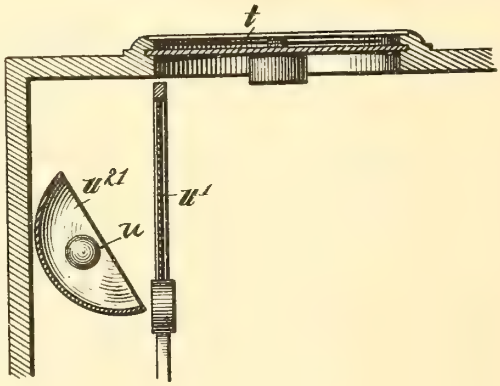
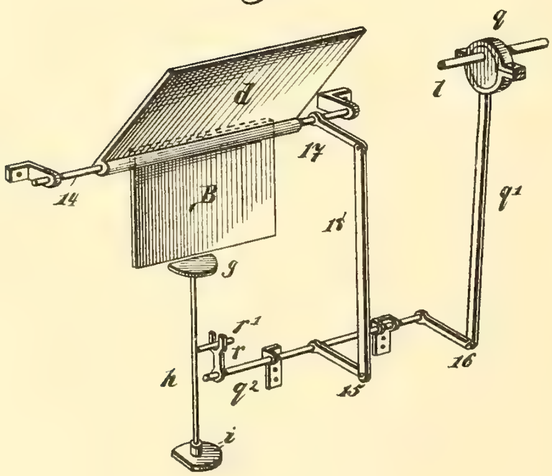


Fig:10.



Witnesses:
H. G. Dieterich
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Inventors:
Franz Welleba, Sen.
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by Henry Orth Atty.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRANZ WELLEBA, SR., FRANZ WELLEBA, JR., AND LUDWIG WÄCHTER, OF VIENNA, AUSTRIA-HUNGARY.

ADVERTISING-CLOCK.

SPECIFICATION forming part of Letters Patent No. 479,687, dated July 26, 1892.

Application filed July 24, 1891. Serial No. 400,621. (No model.)

To all whom it may concern:

Be it known that we, FRANZ WELLEBA, Sr., FRANZ WELLEBA, Jr., and LUDWIG WÄCHTER, subjects of the Emperor of Austria-Hungary, residing at Vienna, in the Province of Lower Austria, in the Empire of Austria-Hungary, have invented certain new and useful Improvements in Advertising-Clocks; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

The invention relates to an apparatus for displaying advertisements; and it has for its object the provision of means whereby a number of advertisements are successively exposed to view; also, the provision of means for rendering said advertisements visible at night; also, the provision of means whereby said advertisements may be rendered more conspicuous by presenting the same under different colors; also, the provision of means whereby attention may be drawn to the advertisement by an audible signal, and, finally, the combination, with the advertising apparatus, of a timepiece, and the provision of means for rendering the time indications on its dial visible at night and for rendering said dial more conspicuous by presenting the same in various colors.

To these ends the invention consists in the combination, arrangement, and operation of mechanisms whereby the desired results are attained and in structural features of parts thereof, as will now be fully described, reference being had to the accompanying drawings, in which like symbols indicate like parts wherever such may occur in the several figures, whereof—

Figure 1 is a vertical transverse section of an advertising-clock embodying our invention. Fig. 2 is a rear elevation thereof, the back of the clock-case being removed. Fig. 3 is a detached view of an electrically-controlled motor for operating the feeding and shifting mechanism of the advertising-cards and the shifting mechanism for the screens, said motor being controlled by the movement of the timepiece. Fig. 4 is a front elevation of the advertising-clock, on a reduced scale, the clock mechanism proper being omitted in all of the above-described figures of drawings. Fig. 5 is a plan view of one of the advertising-cards. Fig. 6 is a perspective view of the disks used for shifting the cards from the point of exposure. Fig. 7 is a plan view of a portion of the transmitting mechanism for operating the multicolored screens. Fig. 8 is a top plan view of the mechanism for feeding the advertising-cards from their holder to a chute that conveys them to the point of exposure, the holder being shown in dotted lines. Fig. 9 is a sectional view showthe relative arrangement of the dial-screen, its illuminating device, and the reflector therefor; and Fig. 10 is a detail perspective view of the mechanism for feeding the advertising-cards to and shifting the same from the point of exposure; also, of the transmitting mechanism that is controlled by the motor that actuates the feeding and shifting mechanism for the advertising-cards and screens.

In the drawings, *f* indicates the clock-case, *t* the clock-dial, and *e* a glass-covered aperture for the exposure of the advertisements. (See more particularly Fig. 4.)

The advertisements are printed on or otherwise applied to a card B, of a transparent or more or less transparent material—such as glass, celluloid, mica, or paper rendered more or less transparent—and are framed in a frame *b*, Fig. 5, of light material, such as aluminium.

Along the upper edge of the display-aperture *e* is arranged a crank-shaft 14 at such a distance from the clock-case as to leave sufficient space between the two for the passage of an advertising-card, as shown in Fig. 1.

On the crank-shaft 14 is secured a table or chute *d*, that receives the cards from a holder, as hereinafter explained, which table in its normal position lies in an inclined plane, so that when an advertising-card is fed thereto it cannot pass between the shaft 14 and the clock-case until said table *d* is moved to a position in which said card will be substantially parallel with the front vertical wall of the clock-case.

Below the display-opening *e* is arranged a

vertical rock-shaft h, that carries a mutilated disk g at its upper end and a like disk i at its lower end, each disk having a segment cut away at points at right angles to each other, (see Figs. 6 and 10,) the distance between the upper faces of said disks being equal to the height of an advertising-card, for purposes presently explained. The rock-shaft h has a radial pin r', that lies in the fork at the end of a radial or crank arm r on a rock-shaft q^2, which shaft carries two cranks 15 and 16, the former being connected by a rod 18 to a crank 17 on a rock-shaft 14, and the crank 16 is connected by a rod q' with an eccentric q, that is secured to one of the revoluble arbors of the electrically-controlled motor, Figs. 2 and 3—as, for instance, the arbor l, Figs. 2 and 10. The arrangement of the eccentric q is such that as the arbor l is rotated the shaft q^2 will make a quarter-revolution, first in one and then in a reverse direction, and this rocking movement results in a like movement of the vertical rock-shaft h and the horizontal rock-shaft 14.

In Fig. 2 the parts described are in their normal positions, an advertising-card resting on the upper disk g. If now a second advertising-card is fed to the table d and the rock-shaft q^2 rocked in the proper direction, said table will tilt the card so that it can pass between the shaft and clock-case. The vertical rock-shaft will, however, also be rocked, bringing the cut-away portion of the upper disk g in line with the clock-case, the like cut-away portion of the lower disk being moved out of line with said clock-case, so that the card in rear of the display-aperture can drop down and will be supported by the said lower disk i, the upper edge of said card lying below the lower face of disk g, so that the card delivered by the table will be supported by said upper disk g. When the rock-shafts 14 and h are rocked back to their normal position, both cards will drop down onto a directing board or chute 19, that directs them into a suitable receiver k, these operations being continued until the supply of cards is exhausted.

Within the clock-case, immediately opposite the display-aperture e, is arranged a reflector 21, in front of which is located an incandescent lamp s, connected with a source of electricity, and on a shaft s^4 is secured a circular screen s', one-half of which lies in front of the reflector and lamp, said screen being divided into radial sections in which are arranged differently-colored glasses, said screen having an intermittent motion imparted to it that coincides with the shifting of the advertising cards at the display-opening e, as will be presently described.

Within the clock-case is arranged a holder a, that consists of a rectangular frame for the reception of the advertising-cards B, which are stacked therein and are expelled therefrom one after another at proper intervals, the holder being arranged at a proper elevation, so that the expelled cards may drop onto the receiving and delivery table d, the lowermost card of the stack being expelled by mechanism which we will now describe. Below the holder are arranged two vertical shafts 22 and 23, that carry the intergearing wheels n and n', respectively, and o and o' indicate toggle-levers eccentrically pivoted to said wheels n and n', the links 24 of said levers being rigidly secured to the fulcrums of two ejector-levers c and c', respectively, that work through suitable slots in the rear portion of the holder a, which has a delivery-slot in its front portion, through which the advertising-cards pass to the table d. The shaft 23 carries a bevel-pinion m' in gear with a like pinion m on the driving-arbor l of the electrically-controlled motor, which is the prime motor-shaft for all of the movable elements of the advertising devices, with the exception of the signaling devices. The shaft 22 carries a pinion s^2 in gear with a wheel s^3 on a vertical shaft 1, which latter carries a bevel-pinion 2 in gear with a like pinion 32 on the shaft s^4 of screen s', which derives its intermittent motion, therefore, from shaft 1 through the described gearing. The bevel-pinion 2 on shaft 1 also gears with a like pinion 3 on a short shaft that carries a second bevel-pinion 4 in gear with a like pinion 5 on a horizontal shaft 6. The shaft 6 carries at the end opposite to pinion 5 a bevel-pinion 7 in gear with a like pinion 8 at the foot of a vertical shaft 9, which last-named shaft carries at its upper end a bevel-pinion 10 in gear with a like pinion 11 on the shaft 12 of the circular screen u', and this mechanism is fully shown in Figs. 1, 2, and 7.

The screen u', like screen s', has radial subdivisions provided with differently-colored glasses, which in arrangement may or may not correspond with those in said screen s'. The screen u' whenever space permits is preferably arranged in rear of the clock-dial t; but to avoid increasing the depth of the clock-case for the purpose of accommodating the screen, its illuminating device, and the clock mechanism (which, as hereinbefore stated, is omitted from the drawings) we preferably arrange the screen u' on one side of and at a proper angle to the dial t, an incandescent lamp u or other suitable illuminating device being placed in rear of the screen and provided with a reflector u^{21}, said lamp and reflector being supported from a bracket 13, (see Figs. 2 and 3,) so as to project the light through a colored section of the screen upon the rear face of the dial t, which of course is made of a more or less transparent material.

The motor for intermittently actuating the above-described movable elements of the feed and shifting mechanisms and for imparting an intermittent or step-by-step rotation to the screens, may be a spring-driven motor or a motor driven by a cord and weight, as shown, and consists of a suitable train of gearing 51,

being the cord-drum whose revolution under the action of the weight (not shown) is transmitted by pinion 52, wheel 53, and pinion 54 to the driving-shaft 1. The driving-shaft 1 carries a gear-wheel z, that has a pin z', that actuates the hammer y' of a bell y or the hammers of a chime of bells, as shown in Fig. 3. The gear-wheel z meshes with a pinion 55, whose arbor carries a gear-wheel 56 in gear with a pinion 58.

On the arbor of the wheel 56 is secured a second pinion 57, (shown in dotted lines in Fig. 2,) said pinion gearing with an escapement-wheel x', that has an annular flange in which are formed two slots or stop notches x^2, Fig. 3, adapted to be engaged by a stop-arm x, rigidly secured to the pivot of a lever w, that carries an armature v^4. The lever is a bell-crank or angle lever, the vertical arm carrying the armature, while the horizontal arm is adapted to engage a notch or recess in a stop-disk w' on the arbor of a gear-wheel 59. The horizontal arm of the lever w has at its outer end a lug that projects into the path of a pin w^2 on the face of a gear-wheel w^3, revolved by gear-wheel 59, meshing with a pinion 60 on the arbor of said wheel w^3, which latter meshes with a pinion 61 on the fly-arbor of the motor.

An electro-magnet v^3 is arranged in proximity to the armature v^4, and v is a contact-wheel which is continuously revolved by any suitable motor, but preferably by a revolving element of the clock-movement, suitable transmitting-gearing being employed to impart to said contact-wheel the desired speed of revolution, which will depend upon the length of time it is desired to expose the advertising-cards, the wheel being provided with one or more contacts and driven at a greater or less speed, according to said time of exposure. v' and v^{21} are two contact-springs, the spring v' trailing on the periphery of the contact-wheel v and being connected with one pole of a suitable source of electricity. The spring v^{21} trails upon the arbor of the contact-wheel v and is connected with one of the terminals of the electro-magnet v^3, whose other terminal is connected with the opposite pole of the source of electricity—as, for instance, a battery v^2—said wheel and springs constituting a circuit-closer.

It will of course be understood that any suitable source of electricity may be employed to energize the electro-magnet v^2 and the films of the incandescent lamps s u and that said source of electricity may be located within the clock-case or outside thereof.

The operation of the advertising-clock is as follows: Whenever the spring v' makes contact, a circuit is established through the electro-magnet v^3 and its armature v^4 is attracted, thereby lifting the horizontal arm of the armature-lever w out of the notch of the stop-disk w', and simultaneously therewith the lug or stop-arm 62 on the end of said horizontal arm of the lever will move out of the way of the pin w^2, while the arm x will be disengaged from its slot or notch x^2 in the escapement-wheel x', thereby liberating the motor-train. Inasmuch as the circuit through the electro-magnet v^2 is immediately interrupted, the spring 63 will tend to return the armature-lever to its normal position. The horizontal arm of the armature-lever now lies on the periphery of the stop disk or cam w', while the stop-arm x trails on the annular flange or rim of the escapement-wheel x', the motor-train remaining in operation until said horizontal arm of the armature-lever drops into the recess or depression of the stop disk or cam w', at which time the wheel w^3 will also be stopped by the engagement of its pin w^2 with the stop 62 on the horizontal arm of the armature-lever, and simultaneously therewith the arm x will drop into a notch x^2 of the escapement-wheel, thereby locking the motor-train against operation. This periodical partial revolution of the cord or winding drum 51 of the motor-train is, as before described, transmitted to driving-shaft 1 and through the gearing m m' n n' to the ejector-levers c c', which eject the lowermost advertising-card from the holder a, said card falling onto the table d. The partial revolution of the shaft 1 is also transmitted through the eccentric q to crank-shaft q^2 and by the latter to the vertical and horizontal rock-shafts h and 14, whereby the table d is tilted toward the front of the clock-case to allow the card to slide between rock-shaft 14 and said front of the clock-case in rear of the opening e. Simultaneously therewith the vertical shaft h is rocked to turn the mutilated portion of the upper disk g away from the clock-case, so as to support the card B, the mutilated portion of the lower disk i being in alignment with said clock-case. At the same time a partial revolution is imparted to the screens s' u' through the medium of the gearing s^2 s^3 on arbors 22 and 23 of the gears n n' and the transmitting-gear hereinbefore described. At the next contact the same operations take place, except as to rock-shaft h, which is now turned back to bring the mutilated portion of disk g into alignment with the clock-case, while the mutilated portion of disk i is moved out of alignment with said clock-case, thereby allowing the card previously exposed to drop onto said disk i, said card serving as a support for the card which has just been brought into position for exposure, as shown in Fig. 1, the same operations taking place at the next contact, except that the position of the disks g and i will be reversed, both cards dropping onto chute 19 and sliding thence into the receptacle k, while the card now fed to table d will again be supported by the disk g, as in the start. During each periodical operation of the motor-train the screens s' u' will be revolved a distance equal to one of their radial sections, thereby bringing a differently-colored ground in front of the lamps s u, and at the same time the pins z' will trip the bell-

hammers y' successively, thus giving an audible signal calling attention to the kaleidoscopic changes of the advertisements.

Although we have described our invention in its combination with a timepiece and prefer to control the mechanism that effects the changes from the movement of the timepiece, it is obvious that the latter may be dispensed with and the contact-wheel driven, as hereinbefore stated, by any other suitable motor at the desired speed; but the combination of the timepiece with the advertising devices is not only a matter of convenience, but adds a feature of utility and attraction to the said advertising devices.

Having thus described our invention, what we claim as new therein, and desire to secure by Letters Patent, is—

1. In an advertising apparatus, the combination of the following instrumentalities, to wit: a casing provided with a display-aperture, a rocking support for the cards arranged in rear of said aperture, an inclined rocking table above the rocking support, a holder for the cards proximate to the table, and an ejector for ejecting one card after another from the holder onto the table, for the purpose set forth.

2. In an advertising apparatus, the combination of the following instrumentalities, to wit: a casing provided with a display-aperture, a rocking support for the cards arranged in rear of said aperture, an inclined rocking table above the rocking support, a holder for the cards proximate to the table, an ejector for ejecting one card after another from the holder onto the table, and an intermittingly-operating motor for actuating said devices, for the purpose set forth.

3. In an advertising apparatus, the combination, with a casing provided with a display-aperture, a fixed illuminating device for the same, and an intermittingly-revolving multicolored light-transmitting medium interposed between the illuminating device and display-aperture, of transparent or translucent advertising-cards, a holder therefor, an intermittingly-moving ejector for ejecting the cards one after the other from the holder, an intermittingly-rocking table to which the cards are fed, and an intermittingly-rocking support and shifting device interposed between the display-aperture and light-transmitting medium, to which the cards are transferred by the table, for the purpose set forth.

4. In an advertising apparatus, the combination, with a casing provided with a display-aperture, an illuminating device for illuminating said aperture, a revoluble light-transmitting medium divided into sections differing in color interposed between the display-aperture and illuminating device, transparent or translucent advertising-cards, and a holder therefor, of an ejector operating to successively eject the cards from the holder, a receiver and transfer table adapted to receive the ejected cards and operating to transfer the same to a point between the display-aperture and the light-transmitting medium, a shifting device for shifting the cards from said aperture, and an intermittingly-operating motor for actuating said devices, for the purpose set forth.

5. In an advertising apparatus, the combination, with a casing provided with a display-aperture, an illuminating device for illuminating said aperture, a revoluble light-transmitting medium divided into sections differing in color interposed between the display-aperture and illuminating device, transparent or translucent advertising-cards, and a holder therefor, of an ejector operating to successively eject the cards from the holder, a receiver and transfer table adapted to receive the ejected cards and operating to transfer the same to a point between the display-aperture and the light-transmitting medium, a shifting device for shifting the cards from said aperture, and an electrically-controlled and intermittingly-operating motor for actuating said devices, for the purpose set forth.

6. In an advertising apparatus, the combination, with a casing provided with a display-aperture, an illuminating device for illuminating said aperture, a revoluble multicolored light-transmitting medium interposed between the aperture and illuminating device, transparent or translucent advertising-cards, and a holder therefor, of an ejector operating to successively eject the cards from their holder, a receiving and transfer table adapted to receive the cards and operating to transfer the same to a point between the display-aperture and light-transmitting device, a shifting device operating to shift the cards from the aperture, an audible signal, and an intermittingly-operating motor for actuating said devices, for the purpose set forth.

7. In an advertising apparatus, the combination, with a casing provided with a display-aperture and a time-dial and containing a time movement, of a holder for the cards, an ejector for ejecting said cards from the holder one after the other, a rocking table to which the cards are fed, a rocking support and shifting device in rear of the display-aperture for supporting the cards thereat and shifting the same therefrom, and a motor controlled by the time-movement to intermittingly operate said devices, for the purpose set forth.

8. In an advertising apparatus, the combination, with a casing provided with a display-aperture, a fixed illuminating device, and a multicolored light-transmitting device interposed between the display-aperture and the illuminating device, of a holder for the advertising-cards, located above the display-aperture, a feed-table interposed between the holder and display-aperture, adapted to receive the cards and transmit them to said aperture, feeding mechanism for feeding the cards one after another from the holder to the said table, a shifting mechanism, such as described, for shifting said cards from said aperture, an intermittingly-revoluble driving-

shaft, and transmitting mechanism operated by said shaft and operating the revoluble light-transmitting device and the card feeding and shifting devices, substantially as and for the purposes set forth.

9. The means for transferring the advertising-cards to the display-aperture *e* and shifting the same from said aperture, consisting of the table *d*, the rock-shaft 14, carrying said table, the rock-shaft *h*, carrying the mutilated disks *g i* and having a radial arm *r'*, and the crank-shaft q^2, connected with rock-shaft 14 and having a forked crank-arm *r* in engagement with the radial arm *r'* of rock-shaft *h*, in combination with a revoluble driving-shaft carrying an eccentric connected with the crank-shaft q^2 and operating to impart a rocking motion to said shaft, as described, for the purpose set forth.

10. The means for illuminating the display-aperture *e*, consisting of a lamp and reflector and a circular transparent screen interposed between the lamp and aperture, said screen being divided into sections of differently-colored glass arranged relatively to the lamp to present one of its sections thereto, in combination with an intermittingly-revoluble driving-shaft and transmitting-gear for transmitting a like motion to the screen, for the purpose set forth.

11. The means for intermittingly feeding the transparent or translucent advertising-cards to the receiving and transfer table *d*, consisting of a holder for the cards, having a slot in its opposite lower ends, a pair of ejector toggle-levers *c c'*, adapted to operate in the rear slot of the holder, the intergearing wheels *n* and *n'*, to which the links of the toggle-levers *c c'* are respectively connected, and the bevel-pinion *m'* on shaft of gear *n'*, in combination with the motor-shaft 1, carrying bevel-pinion *m* in gear with pinion *m'*, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

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FRANZ WELLEBA, Jr.
LUDWIG WÄCHTER.

Witnesses:
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(No Model.) 4 Sheets—Sheet 1.

W. F. GARDNER.

CLOCK SYNCHRONIZING DEVICE AND SYSTEM.

No. 480,577. Patented Aug. 9, 1892.

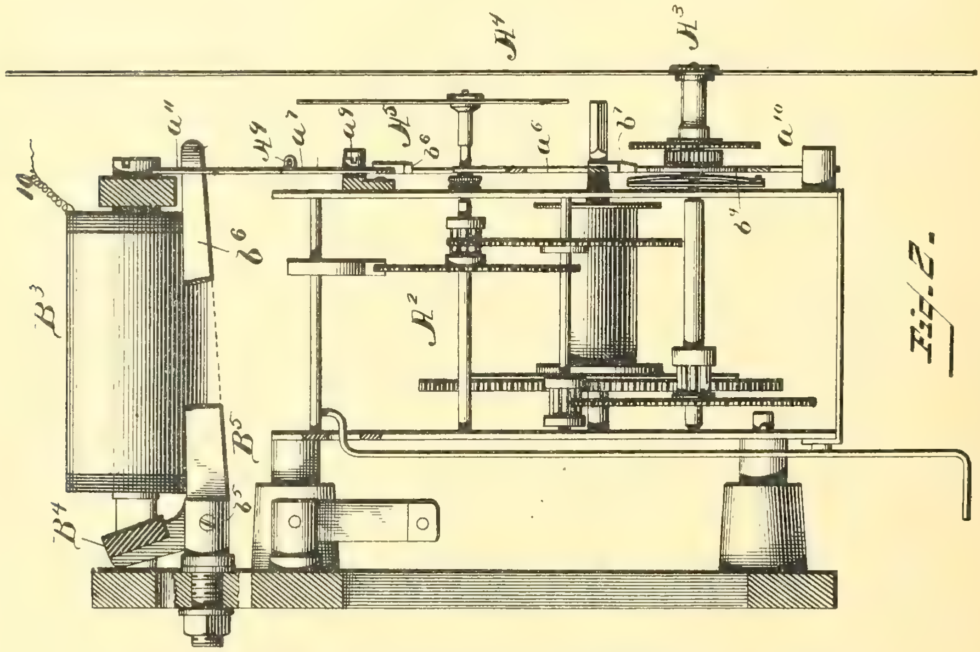

Fig. 2.

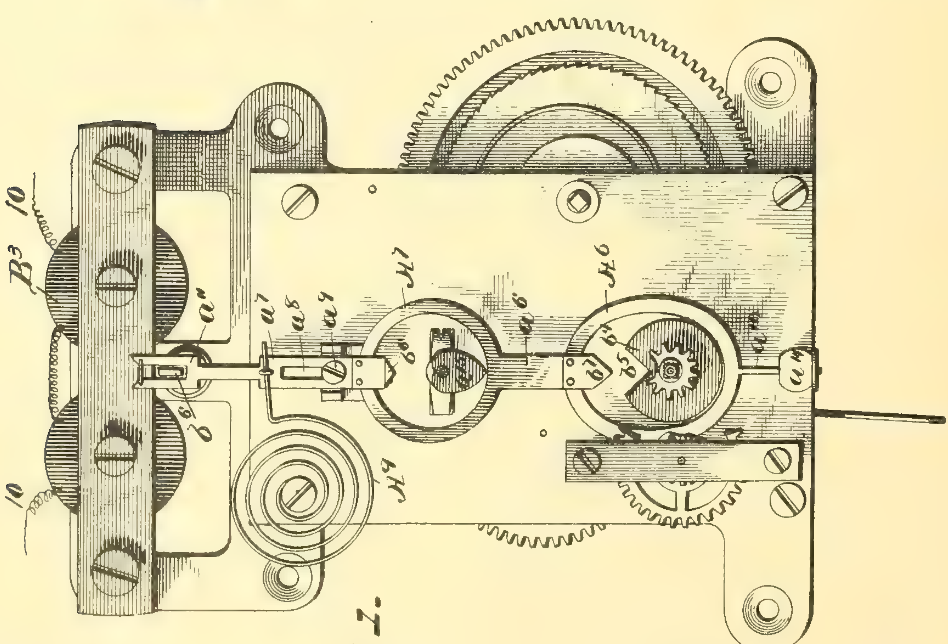

Fig. 1.

Witnesses

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CLOCK SYNCHRONIZING DEVICE AND SYSTEM.

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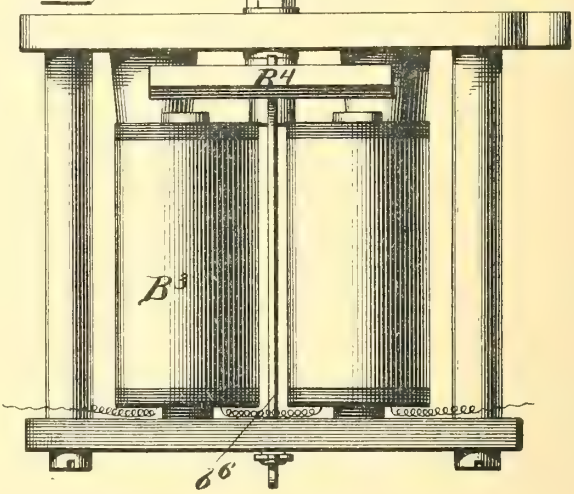
Fig. 3.



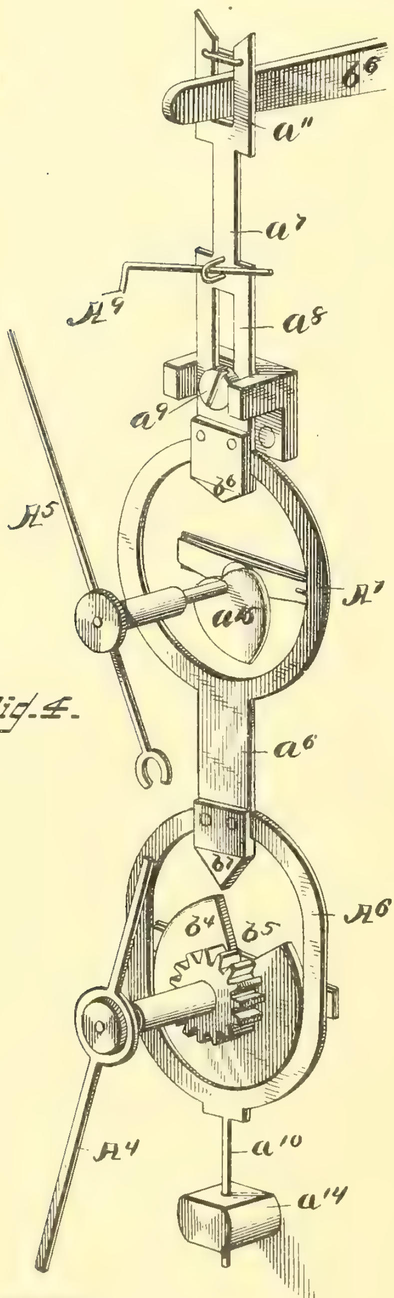
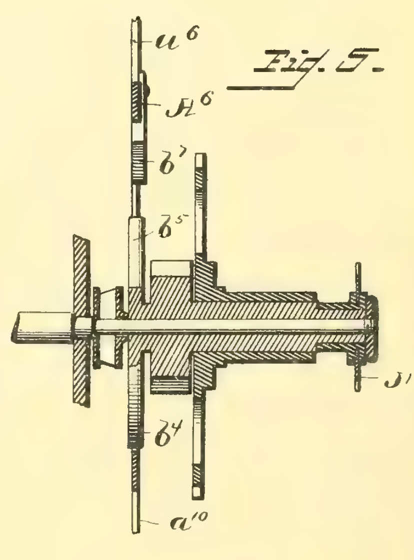


Fig. 4.

Fig. 5.



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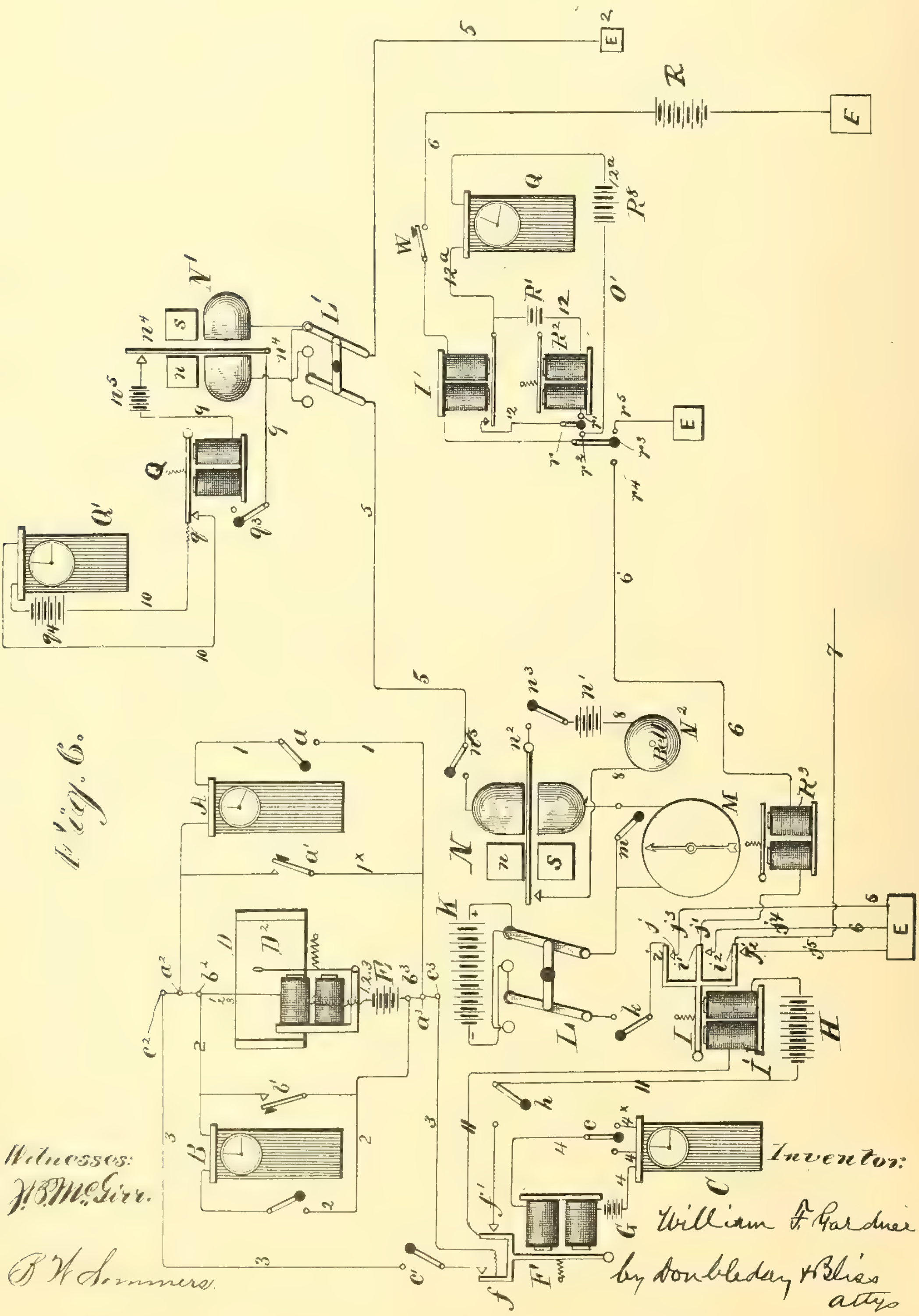

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CLOCK SYNCHRONIZING DEVICE AND SYSTEM.

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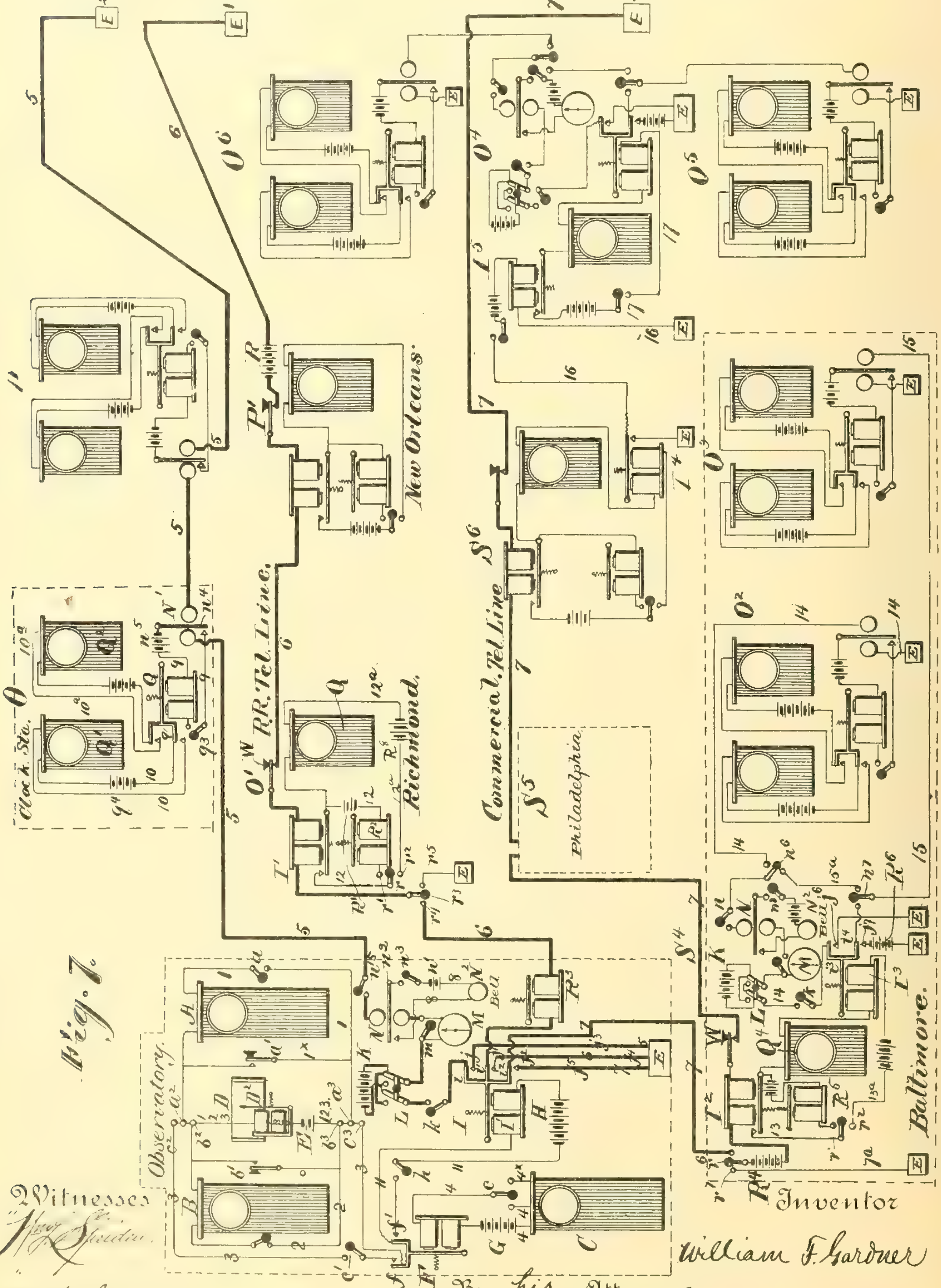

Witnesses
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UNITED STATES PATENT OFFICE.

WILLIAM F. GARDNER, OF WASHINGTON, DISTRICT OF COLUMBIA.

CLOCK-SYNCHRONIZING DEVICE AND SYSTEM.

SPECIFICATION forming part of Letters Patent No. 480,577, dated August 9, 1892.

Application filed December 13, 1888. Renewed July 8, 1892. Serial No. 439,421. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GARDNER, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Clock-Synchronizing Devices and Systems, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to improvements in devices for controlling or synchronizing clocks, it pertaining more especially to devices of the class used for controlling or synchronizing clocks whose time-measuring movements are effected by one or the other of the ordinary trains of gearing actuated by springs or weights in contradistinction to those clocks whose movements are caused by electrically-actuated mechanism. However, I wish it to be understood that there are numerous features of the present invention which can be applied to the systems and devices for controlling or synchronizing clocks of any of the now well-known forms.

The invention relates not only to the devices which are directly connected with or form part of the clocks proper, but also to the devices which are used for transmitting electric impulse to the controlled or synchronized clocks from points at a distance therefrom—that is to say, the apparatus herein presented, when regarded as a whole, may be treated as a system for attaining the ends above referred to, including the appliances of a central or observatory station, the appliances at various sub-stations of several sorts, and the appliances immediately incident to the clocks themselves, which it is the main purpose to reach, whether they be near to or distant from the central observatory or transmitting station.

Among other things, also, the invention relates to a novel method of testing the wires and other metallic parts in a clock-circuit on which clocks may be arranged for regulation, control, or synchronizing.

Figure 1 is a face view of a clock-movement having applied thereto synchronizing mechanism embodying my improvements. Fig. 2 is a side view of the same. Fig. 3 is a top plan view. Fig. 4 is a perspective of a part of the synchronizing devices. Fig. 5 is a sectional view of part of the mechanism, taken along the axis of the arbor. Fig. 6 is a diagrammatic station and some of the parts included in outside stations. Fig. 7 is a similar view showing somewhat more extensively some of the ways of applying my improved system.

First, referring to what I herein term the "observatory station," I have represented in Fig. 6 as forming parts thereof an astronomical clock at A, a mean-time clock at B, a transmitting-clock at C, and a chronograph at D in connection with various electrical circuits, as at 1 1 2 2 3 3 4 4, the first three being operated by a common battery at E and the latter by a battery at G.

The astronomical clock A is in circuit with the marking-instrument of the chronograph by means of the parts 1 1 1, there being a switch at a and binding-posts at a^2 a^3, together with a key a' in a cross-circuit $1^\times$, adapted to short-circuit or cut out the clock A. The switch a being closed, it will be seen that the impulse from the clock A will be transmitted to the chronograph in an obvious manner.

The mean-time clock B is by means of the circuit 2 2 2 also connected with the marking-instrument of the chronograph, there being a cut-out or short-circuit key at b'. The wires of the circuit 2 2 2 are fastened to the binding-posts b^2 b^3. The clock B being in operation, its impulses will be indicated by the marking-instrument at D^2 of the chronograph. Both the clocks A and B being in operation, their impulses will be both indicated at the same point. If their impulses are synchronous, but one mark will be made for each impulse; but if they are not, each clock will exhibit its indications separately from those of the other, and in this way a comparison can be readily made.

The transmitting-clock C contains mechanism substantially similar to that shown and described in my earlier patent, No. 287,015, dated October 23, 1883, said mechanism comprising two sets of devices for making and breaking an electric circuit, one set having in circuit the parts 4 4 4 and the other the parts 4 4 $4^\times$, there being a common battery G and repeater F. The first set of make-and-break devices in the clock is utilized to trans-

mit certain predetermined impulses or preliminary time-signals, and the second set transmits a final signal to or electric impulse, such as I employ for synchronizing clocks at a distance from the transmitting-clock C, all of which will be fully understood by a reference to the aforesaid patent; but I do not wish the present invention to be in all respects limited to devices exactly similar to those in that patent for that purpose. By turning the switch c to the left a current from battery G passes through the circuit having parts 4 4 4 and through the repeater to the preliminary signaling devices. By turning it to the right it passes through the circuit having the parts 4 4 $4^{\times}$ and the final signaling or synchronizing or controlling device.

The relay or repeater F has two points $f f'$. The point f is adapted to close the above-mentioned circuit 33 through the battery E, it being a circuit also including the marking-instrument of the chronograph at D and having the terminals of its wires secured to the binding-posts c^2 c^3. If the switch c be closed, the impulse of the transmitting-clock C will be indicated by the motion of the repeating-lever F closing the contacts at f, and if the switch at c' be closed the said impulse of the transmitting-clock will be also indicated by the marking-instrument at D. By means of the devices arranged in this way, or one substantially similar thereto, it will be seen that an accurate visual comparison can be made between the clocks A, B, and C, two or more. Ordinarily in practice a comparison is first made of the clocks A B, the astronomical clock, and the mean-time clock for the purpose of ascertaining the error of the latter at the time of the comparison, the mean-time clock B being allowed to remain unchanged or uncorrected, although its daily and other variations are carefully noted. Then after the comparison of these has been completed by means of the chronograph the mean-time clock B and the transmitting-clock C are similarly compared, the circuit 2 2 2 being closed for the one and the circuits 3 3 3 and 4 4 4 for the other. If as a result of said comparison it is ascertained that the transmitting-clock C is slightly out of the true time, it is accelerated to such an extent as to advance it to the proper point, it and the mean-time clock B still remaining in circuit with the chronograph, which latter indicates the acceleration. On the other hand, if the clock C is too fast it is retarded until the chronograph indicates that it is at the proper point in relation to the mean-time clock B.

Suppose now that the transmitting-clock C has been so changed as to indicate absolutely correct time, I will describe the manner of transmitting by it electric impulses which can be utilized to convey a program of signals or to control, regulate, or synchronize distant clocks. The point at f' of the relay or repeater F, above referred to, is in a circuit 11 with a local battery at H, there being in this circuit 11 an electric magnet I^5 of a multiple-pointed repeater I. At h there is a switch whereby this local circuit 11 can be opened or closed, as desired. The relay or repeater at I can be provided with as many points as there are main lines from which it is desired to transmit the impulses for signaling, correcting, synchronizing, or other purposes. As shown, the relay or repeater has three contact-arms i i' i^2 with three contacts-points j j' j^2. Each has an earth connection j^3 j^4 j^5 and is in a main-line circuit, one indicated by 5 5 5, another by 6 6 6, and a third by 7 7 7.

For the purpose of illustrating and describing some of the various uses to which the invention can be applied, let it be supposed that the circuit 5 5 5 is one extending out from the observatory-station for the sole purpose of operating, controlling, regulating, or synchronizing clocks or for transmitting time-signals, that the circuit 6 6 6 extends out from the said station for the purpose of transmitting signals along the line of one or more railways and for operating, controlling, or synchronizing the clocks thereon, and that the circuit 7 7 7 extends out from the said station for the purpose of transmitting similar signals and for regulating and controlling clocks along the line of a telegraph company extending to distant points, at each of which it is desired to take from the said main line the signals or correcting or synchronizing impulses. As just said, the main line or circuit 6 6 6 is indicated as passing out from the observatory-station to a series of railroad-stations. The latter are generally indicated in Fig. 7 by O′ P′, there being for this circuit a battery at R at some point distant from the observatory-station—that is to say, the circuit 6 6 6 may be regarded as one of the main telegraph-lines now in use by railroads. It is provided with one or more switches, such as at r^3, by which the main line can be connected to the ground, as at r^5, outside of the observatory, or can be connected, as at r^4, to an observatory branch. As aforesaid, the said branch is in the observatory-station connected to the arm i' of the relay or repeater I, the corresponding contact j' running to earth. This line 6 6 at the railroad-station O′ passes through the electro-magnet of a main-line relay or repeater at I′, adapted to close one or more local circuits. In Figs. 6 and 7 two are shown, one at 12 12, including battery R′ and sounder R^2, and the other at 12^a 12^a, including battery R^8 and clock Q, both including the switch r and the armature of relay or repeater I′. When switch r is at r', the circuit through the sounder is closed and the clock cut out. When at r^2, the clock is in circuit and the sounder out. As generally a relatively-low electro-motive force is required to operate the sounder, the battery R′ is made weaker than the battery R^8, the latter having a higher electro-motive force for the purpose of powerfully

affecting the time-signaling apparatus and also, if desired, opening and closing secondary local circuits. At the station P′ there is an arrangement of apparatus similar to that at O′, and of such stations there may be as many as may be desired. Now at a predetermined time—say three or four minutes before it is expected to receive the time-signal or the program of signals or a clock-controlling or other impulse from the observatory-station—the operator in the station at O′ moves the switch r^3 from point r^5 to point r^4. At the proper time thereafter the operator in the observatory places the switch c in the preliminary signal-circuit of transmitting-clock C, the preliminary signal impulses are through relay or repeater F felt in circuit 11 through the relay or repeater I in circuit 6 6, and through the relay or repeater I′ in circuit 12 12, where they are indicated to the operator by the sounder R^2, switch r r being at this time on the point r'. After the preliminary signal or signals have been transmitted the operator in the observatory moves switch c to the point at $4^\times$ and the operator at station O′ moves the switch r to point r^2. Thereby the mechanism in the observatory is adjusted to send out the final impulse, and the circuit at the station is arranged to pass its impulse through the clock Q, the sounder being cut out. After switches c and r are thus adjusted the next electric impulse caused through the last-described series of circuits results in setting the hands of the clock at Q to the predetermined point, it being for the present supposed that this clock is adapted for this purpose. Simultaneously the clocks at station P and at all others along the railway telegraph-line are affected similarly, the various operators adjusting properly their switches r. After the final signaling or the synchronizing has been accomplished the switch at r is moved to point r' and that at r^3 to point r^5, whereupon the telegraph-line is in a normal condition for ordinary work.

In the observatory there is an indicator at R^3 in circuit 6 6, which manifests to the attendant there whether or not the line is receiving the signals sent out.

Referring now to the circuit 5 5 5, which, as above said, is intended solely for time-signaling or for actuating or regulating clocks directly from the observatory or transmitting station, it will be seen that said circuit either actually or possibly includes the earth connection j^3, contacts j i, switch at k, and pole-changing switch at L and battery K, a galvanometer M and polarized relay N, a switch at n^{15}, all within the observatory or central transmitting station, and then the outgoing line-wire 5 5, extending to the sub-stations O and P, &c., there being at each of the latter a polarized relay N′, the stations being indefinite in number and the main line ultimately terminating in earth, as shown at E^2. The switch at m cuts out or in the galvanometer M. The polarized relay N opens or closes a local circuit 8 8, including a small battery at n', a switch n^3, armature n^2, and a bell, clock, or indicator N^2.

At each of the distant stations O P, &c., I prefer to have substantially the same apparatus. The armature n^4 of the polarized relay N′ closes local circuit 9 9, having battery n^5, magnet of relay or repeater Q, and switch q^3. Arms q of repeater Q close the circuits 10 10 10^a 10^a, &c., each including a signaling or clock controlling, actuating, or synchonizing mechanism.

The clocks adapted to be synchronized are shown at Q′ Q^2, each with its independent circuit; but there may be variation both as to the signal-receiving devices and as to the number in a circuit. Now if it be supposed that the switches h k n^{15} q^3 are all closed, it will be seen that an impulse in circuit 4 4 will (through relays or repeaters F, I, N′, and Q) be experienced in circuits 10 10^a, which can be indicated by signal-receiving apparatus or utilized to synchronize or otherwise to test the clocks Q′ Q^2. When a circuit of the character of this at 5 5 and its indicating devices are connected with such a clock as that at C, the switch k is not closed until after the preliminary signals have been given, (in cases where they are employed;) but as soon as the switch C is moved to contact at $4^\times$ the switch k is closed, so that the final impulse in the circuit 4 4 $4^\times$ is experienced in the outgoing circuit 5 5. When so arranged, it is impossible to impart to the clocks Q′ Q^2 accidental impulse.

From the above it will be seen that with my system I can from one and the same central transmitting or observatory station operate several circuits differing materially from each other in their purpose and connections.

Still referring to the circuit 5 5 and the parts thereon, I will describe the method I have devised for testing. Experience shows that it is frequently necessary to test a circuit such as this for the purpose of ascertaining whether there is any undue leakage or any complete break and also to locate a place of leakage or break if one is found to exist. I prefer to locate the principal portion of the essential parts of the testing apparatus in the observatory or central transmitting station; but that is not necessary.

Referring to Figs. 6 and 7, it will be seen that the "four-point" or pole-changing switch L is in such position as to turn a positive or "direct" current from battery K to line. Under such circumstances the armatures n^2 n^4 of the polarized relays N N′ are drawn toward the north poles n of the permanent magnets constituting part of the said relays, and the armatures n^4 at the distant stations are brought against the contacts which close the local circuits 9—that is to say, when a direct current is thrown to line 5 from battery K the clock-circuits will be closed, and this is the case

when the parts are being operated from the transmitting-clock C in the way above described.

At some time when the line 5 is idle the testing is accomplished as follows: First the the pole-changing switch L is shifted, throwing a reverse current to line. This instantly throws the armature-levers n^2 n^4 toward the south poles s of the permanent magnets and away from the contacts that close the clock-circuits, so that the latter will not be affected. Then the switch m is opened, which throws the galvanometer M into circuit. If the latter indicates the normal amount of resistance, it may ordinarily be presumed that the circuit is in proper working order; but if from these indications or from any other source of knowledge a leakage or a break should be found to exist, the place can be ascertained as follows: At one of the series of stations O P, &c., the switch q^3 is opened, preventing any liability of the clocks at that station being affected by the following manipulations. Then at that station the terminals of the electro-magnets of the polarized relay are reversed either by changing the wires in the binding-posts or by a reversing-switch, as at L′. The result of this is to draw the armature n^4 toward the north pole of the permanent magnet—that is, draw it in the same direction that it is drawn when the clocks are to be affected—because, although a reverse current is to line, it is traversing the coils in this particular station in a direction opposite to that in which it is traversing those in the other stations of the series. Therefore the armatures of all the other relays will remain away from their local-circuit contacts and their clocks are safe. The clock in the station that is being tested is safe by reason of the opening of the switch q^3, above mentioned. Suppose that the first station tested is the middle one of the series. If after the above acts have been performed it is seen that the armature n^4 at that station moves toward its contact, it is proven that there is no trouble on the line between that station and the battery. Thereupon the wire terminals are replaced or the switch L′ is put back to its normal position, the armature n^4 instantly leaving its contact and resting against the south pole s, and the switch q^3 is again closed. Then the one testing the line goes to the next or some other station more remote from the battery and repeats this series of steps. The tests are continued until the faulty point is discovered. In the meantime each and all the clocks have been continued in their normal movement without any interference of the electric impulse sent over the main line.

By means of the bell or indicator at N^2, battery n', and the other part in circuit 8 8 in the observatory or transmitting station the attendant there can be informed as to when the local circuit is being closed and opened when the reverse currents from battery K is in line. It will be seen that the relays or repeaters at Q are of the nature of "main-line" repeaters—that is to say, provided with electro-magnets of one polarity—although they are not arranged directly in the main line, and, further, that they are operated by the polarized repeater or relay which is in the main line. Some of the ends which I attain can be reached if relays or repeaters differing from that at N′ and at Q be used, although I prefer the devices shown. Of course it will be seen that a circuit such as that at 5 5 can, when not being used to affect time-signal-receiving instruments, be utilized for other purposes than testing if a current of one polarity is used for time-signaling and one of opposite polarity be used for the other operations.

Another advantage incident to the use of a current-changing switch, as at L, in connection with polarized relays at the receiving-stations, lies in the fact that after the circuit has been used for the desired purpose the battery can be so connected to the line that if from accident or inadvertence the switch k n^{15} should be closed a current sent to line would not influence the clocks or receiving-instruments, as it would throw the armatures n^4 away from their local contacts. The third main line 7 7 passing out from the observatory-station may be regarded as one of the long lines now used for telegraphing. It is shown in Fig. 7 as extending from the observatory-station first to the central office S^4 of a city or important center. At such main office the branch which extends to the observatory can be connected with the main-line battery R^4 by means of a switch at r^6. When this switch is turned to the contact at r^7, the observatory end of the line is cut off and the wire at the telegraph-station is grounded through the branch 7^a. The circuit 7 7 includes the main-line relay I^2, adapted to close the local circuit 13 13, including a sounder R^5 and having a switch r, adapted to be put to either point r' or r^2.

There is a clock shown at Q^4 for the convenience of the central telegraph-station. This local circuit, together with the clock branch 13^a, the sounder, the battery R′, the relay, and the main line 7 7, is substantially similar to those in railway telegraph-station O′, above described; and in a similar manner the operator at this station by means of a switch r^6 can get signals from the observatory, and by means of his switch at r can pass electrical impulses through the circuit 13 13^a, including the clock Q^4.

As it is desired to transmit to numerous points throughout the city or region around this central telegraph-station, to accomplish this I put in the branch 13^a of the local circuit and multiple relay or repeater. That shown at I^3 has two points j^6 j^7, against which the arms i^3 i^4 can impinge. From the relay or repeater arm i^3 there passes a circuit (indicated generally by 14 14) comprising a switch k, a pole-changing switch L, a battery K, a

galvanometer M, a polarized relay N, a bell N^2, a switch n^3, and other parts similar to those above described as being included within the observatory-station, and there being in addition thereto a switch at n^6, for a purpose to be described. The circuit 14 14, after passing out from its central station, extends out through more or less of the city to one and another of a series of clock-stations, as illustrated at O^2 O^3, and finally to earth. The clock-station at O^2 is substantially similar to that above described and shown at O, and the parts thereof need not be here again described in detail. The other arm of the relay or repeater at I^3 forms part of a circuit 15 15, which when closed includes a battery at R^6, the battery being grounded on one side. This circuit 15 15 extends out directly from the central or transmitting station under ordinary circumstances, it also passing out to one or another of a series of clock-stations, each of which is provided with a polarized relay, a local circuit, a multiple repeater, and one or more clock-circuits, as shown at O.

By means of the polarized relay the battery K and the pole-changing switch L of the central telegraph-station, now being described and above referred to, it will be seen that the circuit 14 14 can be tested in the manner above set forth.

In order to test the circuit 15 15 by means of the same apparatus and to avoid the necessity of duplicating them, I employ a branch circuit, as shown at 15^a, which is adapted to be connected with the battery K, the galvanometer, and the polarized relay, there being a switch at n^7 for cutting out the battery R^6, if necessary, the circuit 14 14 being cut out by the switch at n^6. The parts being properly related, it will be seen that the above-described testing-signals can be as readily sent over line 15 15 as over line 14 14.

Although only two clock-circuits are illustrated as extending from this station, it will be understood that any desired number of them may be used, it being only necessary to vary the multiple repeater at I^3 in such way as to accommodate all of the lines desired or to employ the system of repetition herein set forth by means of a local circuit of sufficient strength to operate a number of repeaters.

Considering further the circuit 7 7, which, as above said, may be regarded as a telegraph-line largely in use, I have indicated at S^5 by dotted lines another such station, which, however, may be regarded as including parts substantially similar to those just above described at the station at S^4.

At the next station S^6 on the main line 7 7 another plan of distributing signals is illustrated. The station S^6 is an ordinary central telegraph-station, such as is found in the larger cities, the essential parts of which are shown, comprising those which have been indicated in describing the station at O′ and at S^4; but in this case none of the apparatus especially intended for distributing the time-signals or for testing the signaling apparatus is situated at the central station. It is in a separate station O^4 at a distance from the main telegraph-station S^6, being connected therewith by means of a circuit 16 16. This circuit is closed by repeater I^4 at the telegraph-office.

A time-signal received at the telegraph-office S^6 over the main line 7 7 will be transmitted to the repeater I^5 in the central time-station O^4. From this repeater it is taken into a local circuit 17, which, with the exception of its lacking a telegraph-sounder, is substantially similar to that shown in the combined telegraph and time station S^4, and from this circuit 17 17 it is transmitted in various directions—as, for instance, to the receiving-stations O^5 O^6—by apparatus substantially similar to that in the station at S^4, this transmitting-station O^4 also having a testing apparatus located therein.

I will here describe more in detail the mechanism which is attached to each of such clocks, as those at O′ O^2, reference being had to Figs. 1 to 5. The train of wheels, the arbors, and other parts constituting the mechanism of each clock proper are indicated at A^2, these as a whole being substantially similar to clock mechanisms now in use. The hour-hand is indicated by A^3, the minute-hand by A^4, and the seconds-hand by A^5. The hour-hand and the minute-hand are mounted upon the same axis, and there is a dial-train of gearing which connects the arbors of the several hands in such way that any rotation or part of rotation of one is transmitted to the other. The hands are so supported upon their arbors, respectively, that they can be turned irrespectively thereof if sufficient force be applied.

A^6 represents a loop surrounding the arbors of the hour and minute hands, and A^7 one around the arbor of the seconds-hand. These loops are joined by a bar a^6, and above that at A^7 there projects a bar a^7. The latter is slotted at a^8 and in the slot fits a set-screw a^9. Below the loop A^6 there is an extension a^{10} fitted into a guide a^{14}, which, together with the slotted bar a^7 and set-screw a^9 holds all of the parts last described in proper position in relation to the arbor. At the upper end the bar a^7 is slotted or forked, as shown at a^{11}, and at A^9 there is a spring which bears against the bar a^7 in such way as to always tend to force it upward.

B^3 indicates an electro-magnet, the two parts of which are horizontal and situated on lines at right angles to the face of the clock. The armature B^4 lies behind the electro-magnet, it being secured to a bell-crank lever B^5, pivoted at b^5 to the clock-frame. The longer arm of this lever b^6 extends forward and is passed through the forked part a^{11} of the sliding parts a^6 a^7 A^6 A^7. When the electro-magnet B^3 is energized, the armature B^4

is drawn forward and the arm b^6 is thrust downward, it carrying with it the last said sliding parts.

On the arbor of the seconds-hand there is a heart-shaped cam a^{15}, and on the arbor of the hour-hand A^3 there is a disk b^4 with a circular outline, except where a section b^5 of a few degrees is removed. The bar a^7 has at its lower end a cam projection b^6, and the bar a^6 has a more or less similar projection b^7. The part b^6 lies in the plane of the cam a^{15} and the part b^7 in the plane of the mutilated disk at b^4.

It will be seen that during a period of a few moments in each day—namely, that period when the mutilated part of the disk b^4 lies below the cam b^7—it is possible for the above-described sliding devices to descend far enough to have the said cam b^7 engage with the inward-extending edges of the recessed part of the disk and to have the cam at b^6 engage with the edges of the recess in the cam a^5, and that when such motion occurs the cams b^6 and b^7 will act to turn the seconds-hand to a predetermined point and also turn the hour-hand by engaging with the inclined edges of the disk b^4 and through the dial-train move the minute-hand.

It will be seen that the push-bar above described reciprocates rectilineally and on lines radial to the arbors of the hands A^4 A^5. This arrangement of the push-bar is superior to the one shown in my earlier patent above mentioned, wherein it is pivoted and rocks about its pivot, especially when it is combined with a stop-disk, as at b^4. When the push-bar is arranged to rock around a center, it cannot be made to move radially to the axis of the arbor, and there is not that precision of adjustment of the hands which is attainable when the bar moves rectilineally and radially.

While for the purpose of making the whole system understood the signal-receiving clocks and the devices for testing the circuits are shown and described, I do not herein claim these, having made them, respectively, the subjects of applications, Serial Nos. 377,023 and 377,024, filed January 7, 1891; nor do I herein make claim for the improvements in the art of transmitting and receiving time-signals, having presented such claims in another application, Serial No. 404,760, filed September 4, 1891, as a division of the present.

I herein refer to a "main line" and also to "local circuits," and mean to be understood much in the ordinary sense. The main line here is the initial or governing line, receiving electric impulses in the first instance and through the repeaters transmitting it to the local circuits. Of course these terms are somewhat relative, and are not to be considered as referring to the magnitude of a secondary circuit or the number of devices included therein. Thus the line 5 5 may be regarded as a main line in relation to the observatory apparatus and in relation to apparatus at such clock-stations, as at O P, and a precisely-similar line, as at 15 15, may be regarded as a local circuit in relation to the main line 7 7, although it (line 15 15) may not really be of greater magnitude than the line 5 5; but in relation to the station S^4 and the clock-stations O^2 O^3 it may be regarded as a main line. Again, such a line as that at 6 6 may both begin and terminate at points so remote from the station corresponding to the observatory-station illustrated that it is not practicable to connect it in the way shown; but in such case the observatory branch of line 6 6 to the left of point r^4 can be connected with a station—such as at S^4 S^5 S^6 of some other telegraph-line—by devices such as are shown in the observatory-station, and in such case, while the railroad telegraph-line is on the one hand a main line in respect to the various circuits opened and closed by it, it may be considered as a local circuit in so far as it is in turn opened and closed by the circuit 7 7 or its equivalent.

It will be seen that time-signal-receiving devices can be employed in carrying out my system differing from the clocks and their attachments herein particularly shown, there being at the present time other well-known devices which can be used as equivalents for these herein to receive time-signals, they being telephone-bells, electric call-bells, &c., depending for their action on an electric impulse.

I herein mention "telegraphic or telephonic circuits," "main-line repeaters," and "telegraphic sounders," &c., and mean to be understood as referring to the circuits and instruments ordinarily used in telegraphing or telephoning during the greater part of the day for purposes of correspondence or sending messages from point to point; but which, or some of which, I utilize during short intervals for the transmission of time-signals.

It will be seen that if at any time the apparatus connecting the observatory (or the station from which the time-signals are transmitted) and one of the receiving-stations—such as that at O′ or S^4—should be out of order, so that time-signals could not be received at the last said station at the usual moment, the operator at said station can nevertheless synchronize, regulate, or adjust the clocks or time-signal receiving devices at the other stations along the line by means of his key W, ordinarily used for telegraphing, or by any other suitable device. At such time the local circuits, as at 12^a, the sounders therein, and the clocks at the several stations can be treated in the same way as they can when use is made of a transmitting-clock similar to that at C. When this is being done under such circumstances, it will be seen that such a station, as that at O′ or S^4, is to be considered as "a time-signal-transmitting station adapted to be connected to the main line," as I herein describe it, and that it contains "time-signal mitting apparatus."

What I claim is—

1. In a time-signaling system, signal-transmitting devices in an observatory or transmitting station, a telegraphic or telephonic main-line circuit, a branch circuit adapted to intermittingly connect the said signal-transmitting devices with the main-line circuit, a receiving-station, a main-line relay or repeater in said main-line circuit at said receiving-station, a local circuit opened and closed by said relay or repeater, said local circuit having two loops or branches with a battery in each loop, a sounder or equivalent receiving mechanism in one of said loops, a clock or time-signal-receiving apparatus in the other of said loops, and a hand-switch whereby the local circuit can be closed at will either through the said clock or through the said sounder, substantially as set forth.

2. In a time-signaling system, signal-transmitting devices in an observatory or transmitting station, a telegraphic or telephonic main-line circuit, a branch circuit adapted to intermittingly connect the said signal-transmitting devices with the main-line circuit, a receiving-station, a main-line relay or repeater in said main-line circuit at said receiving-station, a local circuit opened and closed by said relay or repeater and having two loops or branches, a sounder or equivalent receiving apparatus in one of said loops, a clock or time-signal-receiving apparatus in the other of said loops, a hand-switch whereby the local circuit can be closed at will either through the said clock or through the said sounder, and a switch or equivalent in the said main-line circuit and distant from the observatory or transmitting station for disconnecting said main line from the aforesaid branch, which extends to the observatory or signal-transmitting station, substantially as set forth.

3. In a time-signaling system, a telegraphic or telephonic main-line circuit, devices for automatically transmitting time-signals adapted to be connected therewith, a series of main-line relays or repeaters all in said circuit, a series of telegraph or telephone stations respectively containing said relays or repeaters, telegraph-signal-receiving devices in said station, a primary local electric circuit at each of said stations opened and closed by one of said relays or repeaters, a second repeater in said primary local circuit, one or more secondary local circuits extending out from the said secondary repeater, and one or more clocks or equivalents in said secondary circuits, substantially as set forth.

4. In a time-signaling system, the telegraphic or telephonic main-line circuit, devices for transmitting time-signals adapted to be connected therewith, a series of main-line relays or repeaters in said circuit, a series of telegraph or telephone stations respectively containing said relays or repeaters, a primary local circuit closed and opened by each of said relays or repeaters, a second repeater in said primary local circuit, a series of two or more successively-arranged secondary local electric circuits extending from the aforesaid secondary repeater, and each secondary circuit, except the last, being arranged to open and close a succeeding circuit, and one or more clocks or equivalents in the said series of secondary circuits, substantially as set forth.

5. In a time-distributing system, a receiving-station having a series of two or more electric circuits, as at 10 10 10^a 10^a, one or more clocks or signal-receiving devices in each of said circuits, a multiple relay or repeater opening and closing all of said circuits simultaneously, and an electric circuit, including said multiple relay or repeater and independent of the aforesaid circuit, a main electric circuit, as at 5 5, electro-magnetic devices in said main circuit for opening and closing the aforesaid relay or repeater circuit, and automatic time-signal-transmitting devices at a transmitting-station and which open and close the aforesaid main line, substantially as set forth.

6. In an observatory or time-signal-transmitting station, an automatic time-signal transmitter, a primary local electric circuit opened and closed by said transmitter, a repeater in said circuit, a secondary local electric circuit opened and closed by the said repeater, a second multiple repeater in said secondary circuit, and a series of several outgoing main lines adapted to be simultaneously opened and closed by said multiple repeater, substantially as set forth.

7. In a time-signaling system, an automatic signal-transmitting apparatus in an observatory or central transmitting station, a series of two or more main lines extending out from the said station, and adapted to transmit time-signals therefrom, an electro-magnetic indicator, as at N^2, in the observatory or central station, adapted to be connected to said circuits, whereby the observatory-attendant is informed of the transmission of the signals over said circuits, substantially as set forth.

8. The combination of the clock Q, the electric circuit 12 12^a, the sounder R^2 or equivalent instrument in the said circuit or a part thereof, a main line, as at 6 6, the relay or repeater I' in said main line, and the time-signal-transmitting apparatus at a transmitting-station, adapted to be connected by the main line with the relay or repeater I', substantially as set forth.

9. The combination of the clock Q, the circuit 12^a 12^a and 12 12, the sounder R^2, the battery R', the battery R^3, the switch r, a main line, as at 6 6, adapted to receive time-signals, and the relay or repeater I' in the main line, substantially as set forth.

10. The combination of the clock Q, the circuits 12 and 12^a, the sounder R^2, the switch r, a main line, as at 6 6, the relay or repeater I', and the telegraphing-key in the said main-line circuit, substantially as set forth.

11. The combination of the clock Q, the

sounder R^2, the circuit 12^a 12^a through the clock, the relay or repeater I', having its armature adapted to open and close the circuit through the clock, a main-line circuit through the relay or repeater, and the switch for opening the circuit through the clock, substantially as set forth.

12. The combination of the clock Q, the sounder R^2 or equivalent instrument, an electric circuit through the clock, a battery R^3 therein, the electric circuit through the sounder, a main line, as at 6 6, a relay or repeater, as at I', in said main line, having an armature adapted to open and close the circuit through the clock, and the switch for cutting out the clock, substantially as set forth.

13. The combination of the clock Q, the sounder R^2, an electric circuit through the clock, an electric circuit through the sounder, a main-line circuit, as at 6 6, and a relay or repeater I' in said circuit, adapted to open and close the circuits through the clock and the circuit through the sounder, substantially as set forth.

14. The combination of the clock Q, the sounder R^2, the electric circuit through the clock, the electric circuit through the sounder, the relay or repeater I', adapted to open and close either or both of the aforesaid circuits, the switch r for opening the clock-circuit, the time-signal-transmitting devices at the transmitting-station, a main line, as at 6 6, running through the said relay or repeater I' and having two earth connections, one at the transmitting-station and one outside thereof, and a switch, as at r^3, for joining the main line to either of said earth connections, substantially as set forth.

15. The combination of the time-signal-transmitting apparatus in the observatory or central station, including a multiple-pointed relay or repeater I, a series of two or more main electric circuits, as at 5 5, 6 6, 7 7, extending from said multiple-pointed relay or repeater I out from the observatory or transmitting station, a time-signal-receiving station, as at S^4, a local electric circuit at the said station, a multiple-pointed relay or repeater in the said local circuit, and a series of two or more electric circuits extending out from the last said multiple-pointed relay or repeater to a series of clock-stations, as at O^2 O^3, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM F. GARDNER.

Witnesses:

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H. H. BLISS.

(No Model.) 2 Sheets—Sheet 1.

E. WESTON.

ELECTRIC TIME INDICATING APPARATUS.

No. 480,890. Patented Aug. 16, 1892.

Fig. 1.

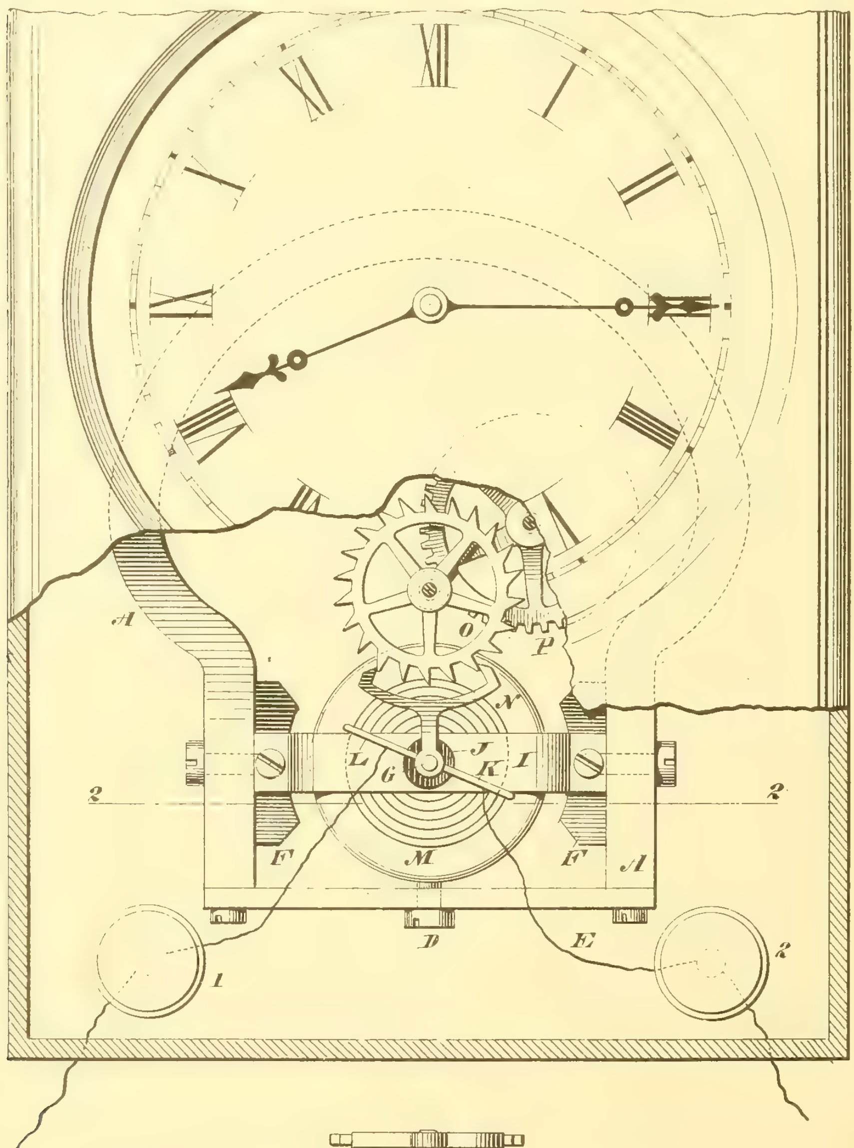
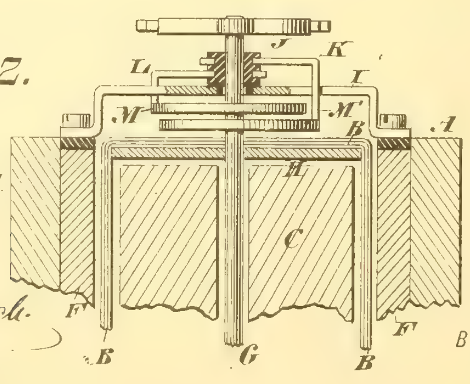


Fig. 2.



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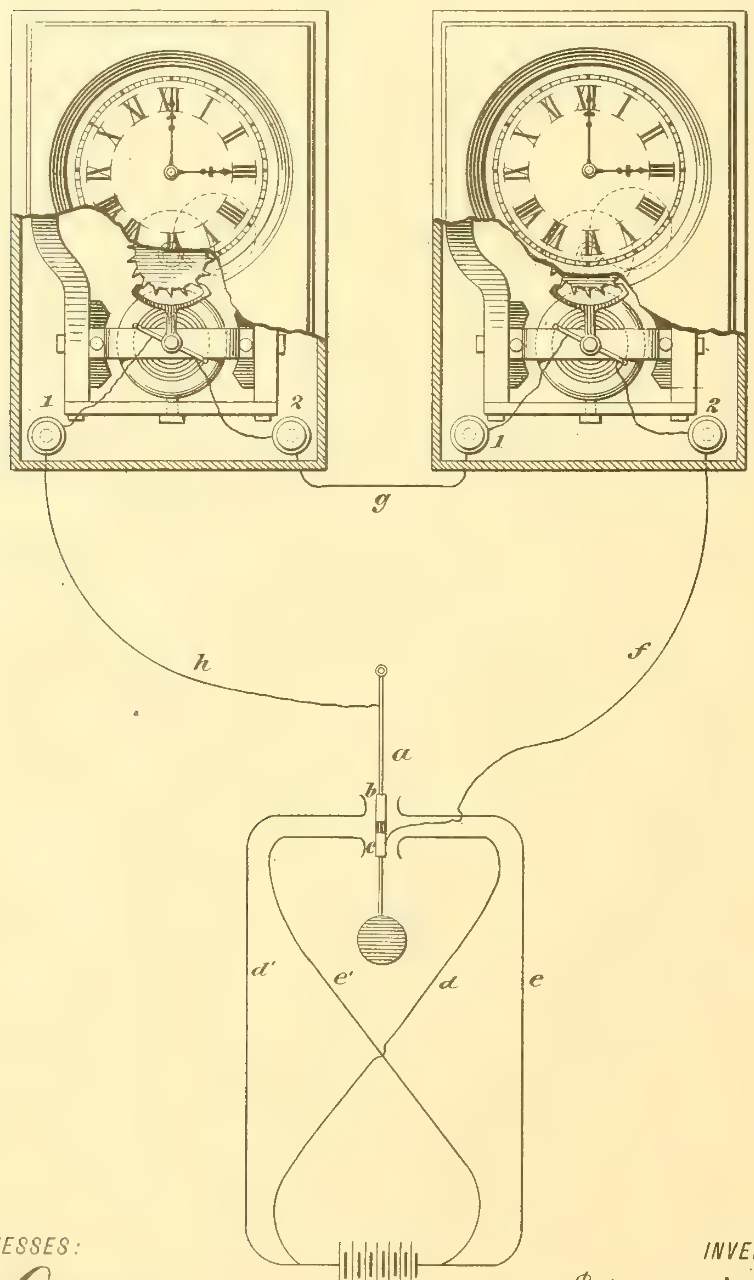
(No Model.) 2 Sheets—Sheet 2.

E. WESTON.

ELECTRIC-TIME INDICATING APPARATUS.

No. 480,890. Patented Aug. 16, 1892.

Fig. 3.



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UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY.

ELECTRIC TIME-INDICATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 480,890, dated August 16, 1892.

Application filed June 4, 1891. Serial No. 395,132. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, of Newark, Essex county, New Jersey, have invented a new and useful Improvement in Electrical Indicating Apparatus, of which the following is a specification.

The principle of my invention is as follows: to organize an instrumentality which under the operation of electrical impulses will cause vibrations of a loop-conductor in a field of force and thereby actuate an indicating device. I embody this principle, broadly, in a combination which includes a means of producing a field of force, a loop-conductor vibrating therein on the passage of a current through said conductor, and an indicating device actuated by said conductor, which device may be organized to show the number of vibrations of the conductor, or the number of electric impulses causing said vibrations, or the duration of time intervals between successive impulses, and consequent vibrations or the duration of the said impulses and hence of the vibrations. An indicating device in the same combination which shows simply the extent of movement of the conductor is not herein claimed, inasmuch as this is fully set forth by me in Letters Patent granted to me November 6, 1888, hereinafter referred to, and to other Letters Patent granted to me.

In my present application I show and describe one embodiment of my said invention, whereby it may be practically operated to produce a useful and beneficial result—namely, the transmission and distribution of time. I do not, however, limit it to that specific application, because it is adaptable to many other useful purposes, and, in fact, wherever electrical impulses are to be transmitted at one part of a circuit to actuate an indicating device at another part—as, for example, in telegraphing.

In the accompanying drawings, Figure 1 is a front view of an electric clock having a portion of the cover or face-plate broken away to show the interior construction. Fig. 2 is a sectional view on the line 2 2 of Fig. 1. Fig. 3 shows the arrangement of two electric clocks with a chronometric device for sending an electric impulse over the circuit at regular predetermined intervals.

Similar letters of reference indicate like parts.

The instrument may be divided into two parts; first, an ordinary clock, preferably not provided, however, with any spring, weight, or other motor mechanism for its train, and second, an electro-motive device by means of which the clock-train is actuated at certain predetermined intervals to cause a proper movement of the hands.

The principle governing the electrical portion of my apparatus will be found set forth in Letters Patent, No. 392,387, granted to me November 6, 1888, and in other patents of subsequent date wherein I have described analogous apparatus.

As in the instrument described in my aforesaid patent of November 6, 1888, my present device contains a magnet A, between the poles of which is disposed a pivoted coil B of fine insulated wire. This coil is supported in normal position by counterbalancing-springs, to be hereinafter described. When traversed by a current, the said coil tends to place itself across the lines of force in the magnetic field, thus rotating over a distance which in accordance with well-known laws bears a relation to the difference of potential between the terminals of the instrument. In the apparatus of my prior patent I avail myself of this principle to adapt the apparatus to use as an electrical measuring-instrument, adding a scale and index to show the amount of angular movement of the coil. Such measuring-instruments have been made in large numbers by me and are now in wide and extensive use throughout this country and abroad. In the present case the movement of the coil is not used to measure the current, but is caused by a current of a strength adapted to the purpose intended—namely, to produce a movement of the coil of sufficient amplitude and force to actuate the clock mechanism. In order to produce such movement, I find a current of very low strength amply sufficient, and the additional load of a well-constructed clock-train does not add very materially to the energy required. It follows therefore that I may place in circuit a large number of clocks, each actuated by its own electric apparatus, the operation of all of which devices will be practically simultanous, so that an

electric impulse sent over the circuit will advance the hands in every clock to practically the same extent. I say practically, because whatever variation there may be within reasonable limits—say, for example, one hundred clocks—will be unimportant so far as the indication of time with sufficient approximation to accuracy is concerned.

Referring now to the mechanism employed, C is a cylinder of soft iron or other magnetic material, which is supported by a screw D on the brass bar E, which in turn is supported on the poles of the magnet A. Between the cylinder C and the pole-pieces F of the magnet there is therefore an intense magnetic field through which the coil B passes. The coil B is supported on a shaft G, which extends through a central opening of the cylinder C. At its opposite end this shaft is held in a suitable step-bearing. (Not shown.) Upon it are fastened two bars of pasteboard, aluminium, or other light material, one of which is shown at H, and these support the coil B. The shaft G extends through a bearing in the fixed bar I, which is fastened to the pole-pieces F. On the bar I is a sleeve or collar of insulating material J, which receives two bent arms K and L. To the bent-over end of the arm L is secured one end of a coiled spring M, the other end of which is fastened to the pivot-shaft G. To the end of the arm K is secured one end of a spring M′, the other end of which is also secured to the pivot-shaft G. These two springs may be wound in opposite directions to counterbalance and hold the shaft in normal position. They may be adjusted relatively to one another by suitably turning the arms K and L to tighten or loosen them. The circuit connections are preferably to be such as to lead the current from one binding-post, as 1, through one spring, as M, thence through the coil B and out at the other spring M′ and binding-post 2, as fully shown and described in my prior patent, No. 392,387, dated November 6, 1888. Supported on the extremity of the pivot-shaft G is an anchor N, which engages with an escapement-wheel O. The escapement-wheel in turn gears with a time-train, one wheel of which is shown at P, and communicates motion to said train. The construction of the train is not fully shown here; but any ordinary train, such as is usually driven by a spring or weight, can be used, the relation of the hour and minute hands and the gearing being the same as in any ordinary timepiece. It is to be understood that motion is here transmitted from the anchor to the pallets of the wheel O, and not, as in the ordinary clock-escapement, from the escapement-wheel to the anchor. At each half-vibration of the anchor one tooth of the wheel is freed and another one acted upon, and of course this vibration may be caused at regularly-determined intervals by simply sending a current into the instrument sufficient to cause the proper movement of the coil on its axis. An arrangement of two of these electric clocks, in connection with means of sending an alternately-reversed and direct current through the instrument, is represented in Fig. 3. The transmitting apparatus is here only illustrated in diagram, which, it should be understood, symbolizes any form of device for accomplishing the same result—namely, the transmission of an electric impulse or alternately-reversed impulses through the circuit.

In Fig. 3, *a* represents an ordinary pendulum carrying two contact-pieces *b c*, which are insulated from one another. The battery-terminals *d e* are arranged at one side of the contact-plates *b c*, and the terminals *d′ e′* are disposed on the opposite sides of said contact-plates *b c*. The contact-plate *c* connects by wire *f* with binding-post 2 of one electric clock, from which the circuit passes through the coil of that instrument, and thence to the binding-post 1, thence by wire *g* to binding-post 2 of the second instrument and through its coil and binding-post 1, and then by wire *h* back to the pendulum-rod *a*. It will be obvious that when the pendulum moves to the left its contact-plates *b c* will make contact with the terminals *d′ e′*, and when it swings to the right its contact-plates will meet the terminals *d e*, whence, obviously, a current from the battery will proceed alternately through the wire *b*, the instruments, and back through wire *f*, and then through wire *f*, through the instruments, back through wire *b*. In consequence of this reversing of the current the coils of both instruments simultaneously will oscillate first in one direction and then in the other, thus causing simultaneous vibrations of the anchor N and consequent movement of the clock-train. For all practical purposes it will probably be sufficient to cause an impulse to pass upon the line once in every minute or half minute, and this may be done either by the vibration of a pendulum or by any kind of chronometric apparatus.

I desire to direct especial attention to the fact that the motor energy for the clocks is supplied by the current which is sent over the line and is not developed by the agency of electro-magnets, and that the clocks have no springs or weights or other independent means of driving them. Where the energy in a time system is applied through the agency of an electro-magnet there is a constant source of error present due to the fact that opposed to the variable energizing force derived from battery is the practically-constant force of the retracting-spring of the armature. In order to overcome this constant force at all times, there must be present a large excess of battery-power; but where a comparatively large current is conveyed there is always more or less sparking and consequent destruction at the metallic contacts, which soon destroy them; and, furthermore, by reason of the fact

that contact is made and broken, a powerful extra current appears at each clock, due to the high self-induction of the coils.

In order to avoid the effects of the extra currents and to reduce the amount of current, which acts injuriously upon the contacts, it is customary to construct a shunt around the electro-magnets; but the effect of this again is to reduce the current below what is needed for the comparatively heavy armature and associated parts, so that in attempting to cure one difficulty another is always met.

It will be observed that in my device there are no electro-magnets to be energized and that the motive power is derived from a coil which is disposed in a strong magnetic field, and the motion of which is due to the reaction of its own field produced by the current upon said permanent field. This coil is always to be made of few turns of wire and of small inductive capacity. The motion of the coil is simply due to difference in potential between the terminals of the instrument, and a very slight difference is quite sufficient to effect this motion, so that, as I have already pointed out, the strength of the current required is exceedingly small—so small, in fact, that theoretically, at least, it is probable that as many as one thousand clocks arranged substantially as herein described might be driven at the expense of no more electrical energy than is required for the controlling of one clock under the existing electro-magnetic systems.

It will be observed that in my present device I actuate the coil first in one direction and then in the other by means of an alternating current obtained from a battery. It will be evident that I may use a direct current to move the coil in one direction against the action of a spring, for example, which spring may, when the current is interrupted, restore the coil to its original position. The current therefore may either directly cause the motion of the coil or it may act upon the spring to compress it or wind it, which spring in expanding may actuate the coil.

I do not wish to be understood as stating that my device cannot be used to control or regulate the clock as well as to drive it, for, obviously, this can be done by the apparatus here illustrated by the simple addition of a spring, weight, or any other motive device to the clock-train in the usual way. In such case the spring will drive the train, but the movement of the latter will be permitted and regulated by the vibrations of the anchor due to the movement of the coil just as an ordinary clock-train is regulated by the movement of the anchor due to the vibrations of the pendulum. The arrangement of the mechanism without the driving-springs, however, is greatly to be preferred.

In practice I propose to locate the controlling-chronometer at any central station and to locate the clocks at different points in circuit with the controlling instrument, so that they will receive an electric impulse therefrom at certain predetermined intervals.

It will be obvious that the time-train, dial, and index here illustrated constitute an example of an indicating device which shows, first, the number of vibrations made by the coil; second, the intervals between the vibrations, these being the periods during which the minute-hand remains at rest; third, the number of said intervals, which corresponds to the number of vibrations, and, fourth, the duration of each impulse, which is the period during which the minute-hand is in motion.

By the term "means of producing a field of force" herein used I mean any device, electrical or magnetic, for that purpose. By a "loop-conductor" I mean a conductor in coil or loop form, and so made in order to include in its loop a number of the lines of force of the field. By the term "indicating device" or "device for showing the result of the vibration of the loop-conductor" I mean any device which imparts such information, whether audibly or visibly, or by simple indication or by record or register. By the term "chronometric device for causing electrical impulses" I mean any device which, controlled or actuated by chronometric mechanism of any sort, will either establish or interrupt or vary the electro-motive force or the resistance to the current on the line at certain intervals. By "time-train" I mean any known transmitting mechanism which may be interposed between the motor and the index of any timepiece.

I claim—

1. A means of producing a field of force, a loop-conductor vibrating therein on the passage of a current, and a device actuated by said conductor for showing the number of its vibrations.

2. A means of producing a field of force, a loop-conductor vibrating therein, a means of causing an electric impulse to traverse said conductor at intervals, and an indicating device actuated by said conductor.

3. Transmitting time electrically by causing an electric impulse at predetermined time-intervals to traverse a loop-conductor disposed in a magnetic field, and thereby effecting a series of movements of said conductor and the consequent operation thereby of a time-indicating device.

4. Transmitting time electrically to separated stations by causing from a central station an electric impulse to traverse at predetermined intervals a series of loop-conductors disposed in magnetic fields connected in electrical circuit and located at said separated stations, and thereby effecting a series of simultaneous movements of said conductors and the consequent operation thereby of time-indicating devices.

5. Transmitting time electrically by causing alternately-reversed electric impulses at predetermined intervals to traverse a loop-conductor vibrating or oscillating in a mag-

netic field, and thereby causing said conductor to vibrate or oscillate in alternately opposite directions, and thus to actuate a time-indicating device.

6. A means of producing a field of force, a loop-conductor vibrating therein on the passage of a current, and a time-train actuated by the movement of said conductor.

7. A means of producing a field of force, a loop-conductor vibrating therein, and a time-train intermittently operated by the movement of said conductor due to the passage of a current.

8. A means of producing a field of force, a loop-conductor vibrating therein, a time-train, and a step-by-step transmitting mechanism actuated by said conductor and operating said time-train.

9. A means of producing a field of force, a loop-conductor vibrating therein, a controlling chronometric device for causing an electric impulse to traverse said conductor at definite intervals, and an indicating device controlled by the vibrations of said conductor.

10. At each of a series of separated stations a means of producing a field of force, a loop-conductor vibrating therein, and an indicating device controlled by the vibrations of said conductor, and at a central or transmitting station a chronometric device for causing electrical impulses to pass at definite intervals over a circuit including said loop-conductors.

11. The combination, with a time-train, index, and dial, of a magnet, a coil vibratory in the field of force thereof, and transmitting mechanism between said train and said coil, whereby the motion of said coil is caused to actuate said time-train.

12. The combination, with a time-train, index, and dial, of a magnet, a coil vibratory in the field of force thereof, springs for balancing and adjusting the extent of motion of said coil, and transmitting mechanism between said train and said coil, whereby the motion of said coil is caused to actuate said time-train.

13. The combination, with a time-train, index, and dial, of a magnet, a coil vibratory in the field of force thereof, transmitting mechanism between said train and said coil, whereby the motion of said coil is caused to actuate said time-train, and a chronometric device for establishing alternately-reversed currents in a circuit including said coil.

14. The combination, with a time-train, index, and dial, a magnet A, and coil H, vibrating on an axial pivot in the field of said magnet, of a toothed wheel O, geared with said time-train, and an anchor N on said coil pivot-shaft and engaging with said wheel O.

EDWARD WESTON.

Witnesses:

R. C. FESSENDEN,

A. F. CONERY, Jr.

(No Model.)

S. SMITH.

RAILWAY TIME SIGNAL.

No. 481,533. Patented Aug. 23, 1892.

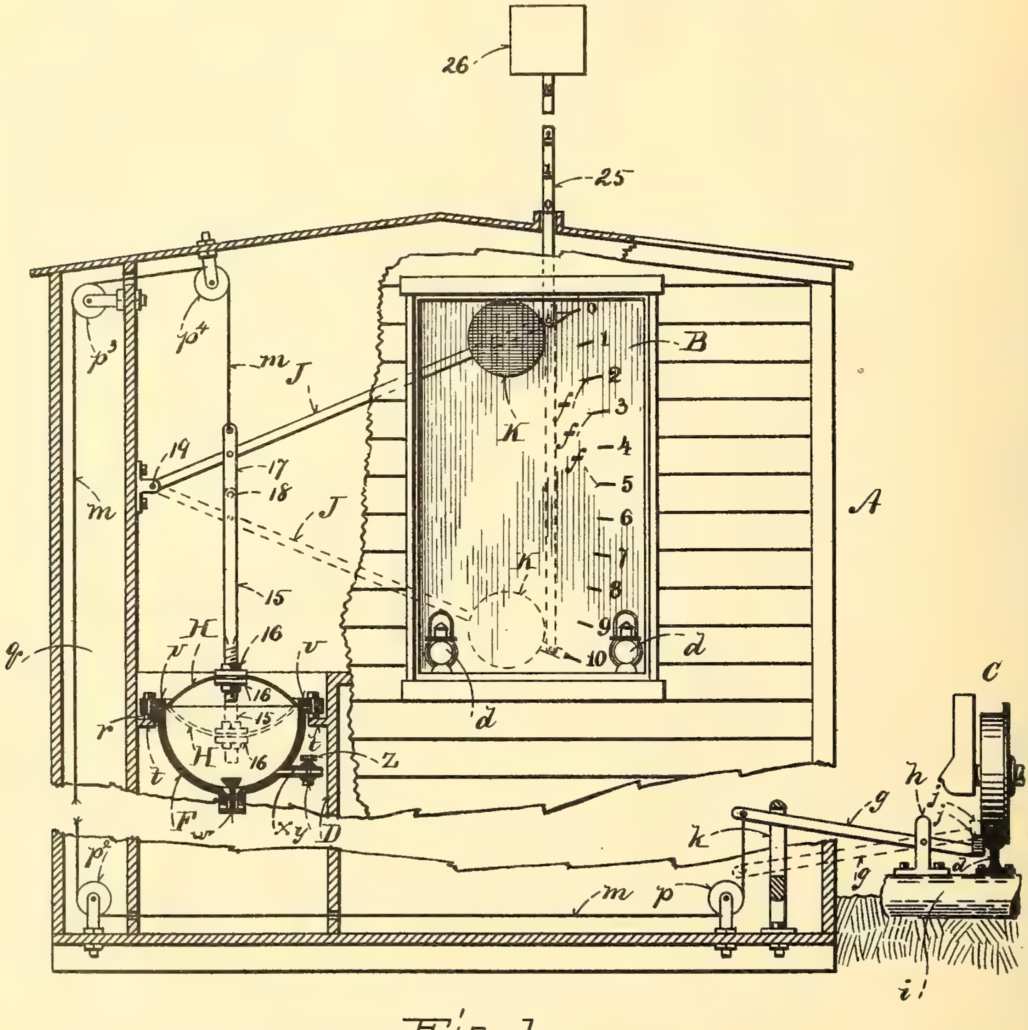

Fig. 1.

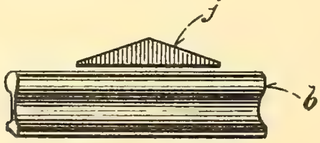

Fig. 2.

WITNESSES:
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INVENTOR:
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PER C. A. Shaw & Co.,
ATTYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

SAMUEL SMITH, OF LAWRENCE, MASSACHUSETTTS, ASSIGNOR OF TWO-THIRDS TO JOHN T. McKONE AND CHARLES E. HILL, OF SAME PLACE.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 481,533, dated August 23, 1892.

Application filed March 14, 1892. Serial No. 424,765. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL SMITH, of Lawrence, in the county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Time-Signals for Railways, of which the following is a description sufficiently full, clear, and exact to enable any person skilled in the art or science to which said invention appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is an elevation showing a portion of a tower or signal-house, partly in section, illustrating the operation of my improved signal; Fig. 2, an elevation of a portion of the track, showing details.

Like letters and figures of reference indicate corresponding parts in both figures of the drawings.

My invention relates to a time-signal mechanism actuated automatically by the passing of a train; and it is designed especially to indicate to the engineer of a succeeding train the time at which such first train passed the signal; and it consists in certain novel features hereinafter fully set forth and claimed, the object being to produce a simpler, cheaper, and more effective device of this character than is now in ordinary use.

The nature and operation of the improvement will be readily understood by all conversant with such matters from the following explanation.

In the drawings, A represents a tower or signal-house, in which a glazed opening or signal-window B is formed. Lanterns *d* are disposed in the window to illuminate the same at night, and on the glass arranged in an arc a series of numbered spaces *f* are imprinted. A horizontally-arranged lever *g* is mounted to swing vertically in a standard *h*, secured to a sleeper *i*, adjacent the track *b*. On the short arm of said lever a triangular plate *j* (see Fig. 2) is secured in position to be engaged by the car-wheel C as it passes and depress the corresponding end of the lever. The long arm of the lever projects within the signal-house and through a slotted guide-standard *k*. To the inner end of the lever a cord *m* is secured, said cord passing over pulleys $p\ p^2$ and upward through a vertical chamber *q*, formed at the rear of the house, thence over pulleys $p^3\ p^4$, supported at the top of the house.

Within a well or other suitable device D a hollow semi-spherical drum F is rigidly secured by laterally-projecting flanges *r*, bolted to lugs *t* on the well-walls. Across the mouth of the drum F a flexible diaphragm H is secured by a clamping-ring *v*, bolted to the drum-flange. In the bottom of said drum there is an air-valve *w* of any construction suitable to admit air into the drum when the diaphragm is elevated and to automatically close when said diaphragm is depressed. In the side wall of the drum there is a laterally-projecting air-port *x*, in which an air-valve *y* is disposed provided with a screw-stem *z*, whereby the escape of air may be regulated. A vertical rod 15 has its lower end threaded, and is secured centrally in the diaphragm by nuts 16. A short rod 17 is pivoted at 18 to the upper end of the rod 15, and the cord *m* is attached to the upper end of said rod 17. An index rod or finger J is pivoted by an end at 19 to a wall of the chamber *q* and projects behind the glazed window B. On its free end a colored disk K is mounted, and the end of said index is in position to register consecutively with the numbers *f* as it swings vertically.

Pivoted to the free end of the index J there is a vertical rod 25, which passes through the roof and has a signal-plate 26 at its upper end. The rod is spaced and numbered consecutively, as shown, the numbers corresponding to the numbers on the window B.

In the use of my improvement a train passing the signal-tower its wheels strike the block *j*, elevating the inner end of the lever *g* and drawing the cord *m* in a corresponding direction. This raises the diaphragm H in the drum F, creating a partial vacuum therein, opening the valve *w*, and drawing air into the drum. The elevation of the diaphragm by its rod 15 carries with it the index J, the disk K being located at the top of the window and the point of the index registering with the zero of the series of numbers *f*. As soon as the train has passed and the contact of the wheels stopped with the block *j*, releasing the lever *g*, the weight of the index and rod

15 causes the diaphragm to fall, gradually ejecting the air in the drum F through the port x, the valve w being simultaneously closed by the air-pressure. The valves w y are arranged to operate in diametrically-opposite directions by the air-pressure, the valve y opening by pressure from within the drum and closing by outside air-pressure. The escape of the air through the port x can be regulated at will by adjusting the valve y. As the air thus gradually escapes from the drum, the index J gradually falls, assuming, when the diaphragm is entirely collapsed, the position shown by dotted lines. The index now points to the numeral "10." It is designed that the parts shall be so regulated as to require ten minutes to follow through its entire course, each space f indicating one minute. The position of the index will thus indicate to the engineer of a succeeding train the length of time which shall have elapsed since the passing of the train preceding it.

The rod 25, numbered and spaced corresponding to the window B, serves as an additional means for indicating the time of the train passing, as described, the lower number exposed as the index falls being taken in this case.

Having thus explained my invention, what I claim is—

1. A time-signal for railways, comprising a pivoted index, a spaced rod attached near the end thereof, a drum provided with valves, a diaphragm closing the mouth of said drum, a rod connected to said diaphragm and pivoted index, a lever actuated by the car-wheels, and mechanism connecting said rod and lever.

2. A time-signal for railways, comprising a drum provided with valves, a diaphragm in said drum, a rod connected to said diaphragm, provided with a pivoted extension, a lever actuated by the car-wheels, mechanism connecting said pivoted extension and lever, and a pivoted index connected to said pivoted extension.

3. A time-signal for railways, comprising a closed dial, a pivoted index, a spaced rod attached thereto, a drum provided with valves, a diaphragm in said drum, a rod provided with a pivoted extension, connected to said diaphragm and to said pivoted index, a lever actuated by the car-wheels, and mechanism connecting said rod and pivoted extension.

4. In a time-signal for railways, the closed dial B and pivoted index J, in combination with the drum F, provided with the valves w y, the diaphragm H, closing the mouth of said drum, the rod 15, connecting said diaphragm and index, the lever g, actuated by contact with the car-wheels, and a connection between said rod and lever, all being arranged to operate substantially as described.

SAMUEL SMITH.

Witnesses:

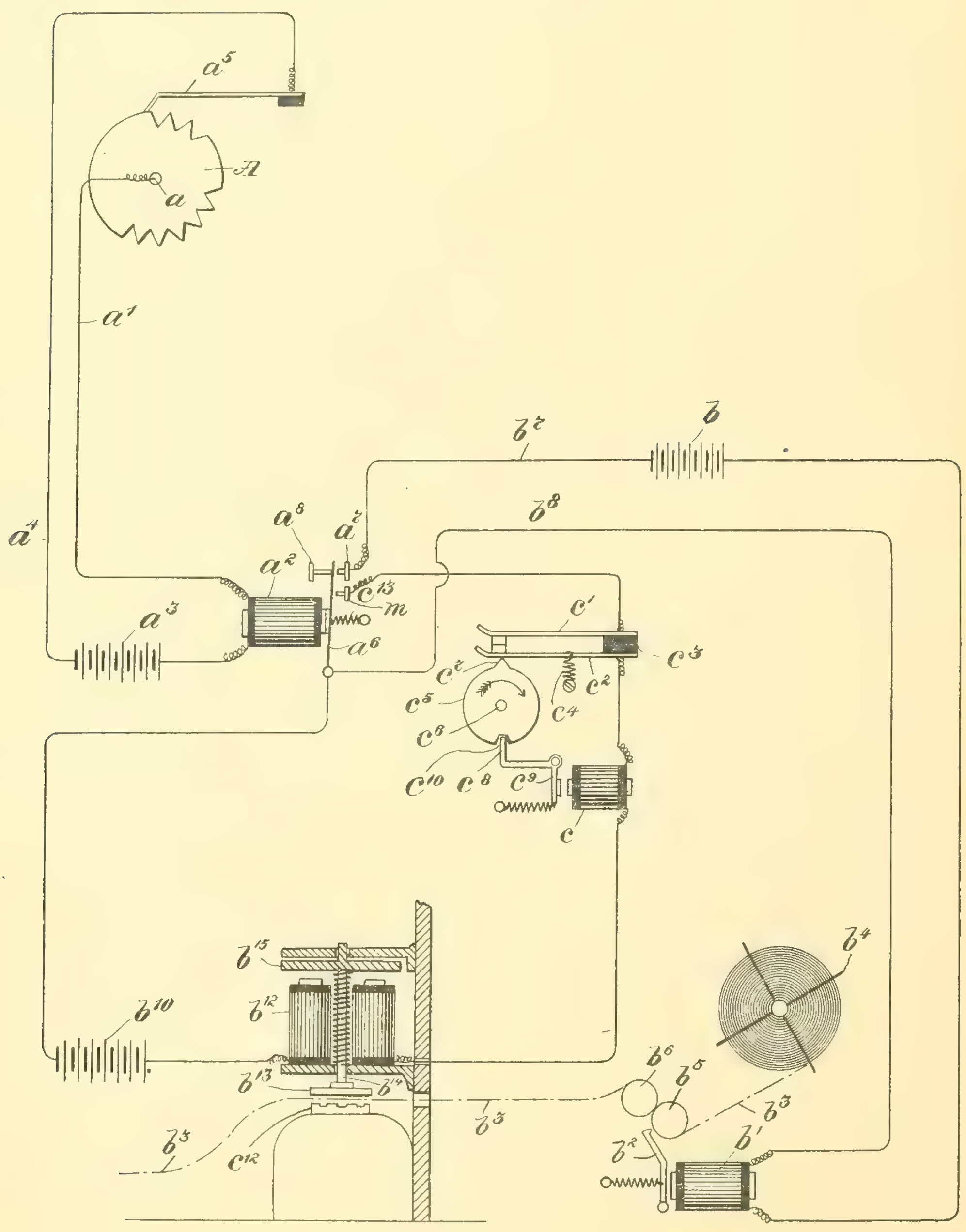
C. A. SHAW,
K. DURFEE.

(No Model.)

H. A. CHASE.

SIGNAL TIMING APPARATUS.

No. 481,613. Patented Aug. 30, 1892.



Witnesses.

G. Henry Marsh

S. C. Fearing

Inventor.

Henry A. Chase

By Jas. H. Churchill

Atty.

UNITED STATES PATENT OFFICE.

HENRY A. CHASE, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO ALBERT WATTS, OF SAME PLACE.

SIGNAL-TIMING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 481,613, dated August 30, 1892.

Application filed May 11, 1892. Serial No. 432,615. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CHASE, residing in Boston, county of Suffolk, and State of Massachusetts, have invented an Improvement in Signal-Timing Apparatus, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to a signaling system, and has for its object to provide a novel construction and arrangement of apparatus for recording the signals and distinguishing the time of the reception of the said signals, as will be described.

In accordance with my invention a message-recording apparatus, which may be of any usual or well-known form of registering mechanism—such as the Morse register—is located in a local circuit controlled by a relay included in the main-line circuit containing the signal-transmitting apparatus. The relay, in accordance with my present invention, also directly controls an independent local circuit, in which is included the electro-magnets of a time-stamp, which may be of any usual or well-known construction—such, for instance, as shown in United States patent granted to J. C. Hinchman, dated October 10, 1882, No. 265,808. The local circuit of the time-stamp has included in it a second electro-magnet governing the action of a circuit-controller, which co-operates with normally-closed circuit-terminals of the local circuit containing the time-stamp magnets, the circuit-terminals being normally held closed by the said circuit-controller until its electro-magnet is energized, as will be described, whereupon the normally-closed circuit-terminals are separated to open the local circuit of the time-stamp at the said circuit-terminals. The circuit-controller, which is preferably made in the form of a disk or wheel having a projection or tooth upon its periphery, is actuated by a motor mechanism, which may be a spring or a clock mechanism of any usual or well-known construction, the said disk in its normal position having its tooth or projection in engagement with one of the normally-closed circuit-terminals to bring the said circuit-terminal into engagement with its co-operating circuit-terminal and thereby hold the local circuit of the time-stamp closed at that particular point until the said local circuit is closed by the armature of the relay.

The circuit-controlling disk or wheel is adapted to be rotated by its motor mechanism when released by the armature of its governing electro-magnet, and its actuating-motor mechanism may be controlled so that any desired period or length of time may elapse while the controlling-disk is making a complete revolution, during which time the normally-closed circuit-terminals remain open and the time-stamp thereby rendered inoperative, irrespective of the closures of the local circuit by the armature of the relay.

The particular features in which my invention consists will be pointed out in the claims at the end of this specification.

The drawing represents in diagram a sufficient portion of a signaling system to enable my invention to be understood.

A represents a break-wheel of a signal-transmitting apparatus, which may be of any usual or well-known construction—such as commonly used in fire and police signaling systems—the wheel A being mounted upon a shaft a, which in practice is rotated by a motor mechanism of any usual or well-known construction, the said wheel, as herein represented, having connected to it one wire a' of a main-line circuit including a relay-magnet a^2 and connected to one pole of a main-line battery a^3, the other pole of which is connected by a wire a^4 to a pen or brush a^5, co-operating with the break-wheel A.

The break-wheel A is provided on its periphery with a series of notches or teeth. (Herein shown as representing the number "36.")

The relay A^2 is provided with an armature a^6, co-operating with a back stop a^7, and, as herein represented, with a front stop a^8.

The main-line circuit is represented as a normally-closed circuit, and the armature a^6 of the relay a^2 is attracted against its front stop a^8.

In accordance with my invention the armature a^6 of the relay a^2 governs two independent local circuits, one of which includes a local battery b, and a registering mechanism

of any usual or well-known construction and herein shown as an electro-magnet b', controlling the operation of a marking pen or stylus b^2, adapted to operate upon a strip of paper b^3, normally wound upon a reel b^4, the said paper passing between guide-rolls b^5 b^6.

The local circuit containing the battery b and the electro-magnet b' has one of its wires, as b^7, connected to the back stop a^7 and its other wire b^8 connected to the armature a^6. The second local circuit controlled by the armature a^6, in accordance with my invention, includes a local battery b^{10} and the electro-magnets b^{12} of the time-stamp, which may be of any usual or well-known construction, such as shown in the patent referred to, the said time-stamp being herein represented as provided with a movable presser b^{13}, connected by the rod b^{14} to the armature b^{15} for the electro-magnets b^{12}. The local circuit of the battery b^{10} also includes an electro-magnet c and normally-closed circuit-terminals c' c^2, herein represented as spring-arms mounted upon an insulating-block c^3, the circuit-terminal c^2 being adapted to be moved away from the terminal c' by a spring c^4. The circuit-terminals c' c^2 are normally closed and are held in their closed position by a mechanical circuit-controller, represented as a disk or wheel c^5, mounted on a shaft c^6 and provided on its periphery with a tooth or projection c^7, which, in the normal position of the disk c^5, engages the circuit-terminal pen c^2 and forces it into contact with the circuit-terminal pen c'.

The rotary disk c^5 is adapted to be rotated by a motor mechanism, which may be a spring or clock mechanism of any usual or well-known construction and not herein shown. The disk c^5 is held in its normal position and prevented from rotating, as herein shown, by an arm c^8, fast to the armature c^9 of the electro-magnet c, the arm c^8 entering a notch c^{10} in the periphery of the disk c^5.

The paper strip b^3 is fed between the presser b^{13} of the time-stamp and the time-indicating surfaces or dials (not herein shown, but represented by c^{12}) and the time is imprinted upon the strip b^3, as will be described.

As represented in the drawing, the local circuit of the register is normally open between the armature a^6 and its back stop a^7, and the local circuit containing the time-stamp is also normally open between the said armature and a second stop m, to which one wire, as m' of the time-stamp local circuit, is connected, and is complete throughout the rest of the circuit.

When the signal is transmitted from the apparatus or box containing the signal-transmitting wheel or surface A, the armature a^6 of the relay a^2 is withdrawn by its retractile spring c^{13} at each break or interruption in the main-line circuit caused by a tooth in the break-wheel A, and each impulse or break in the main-line circuit effects a closure of the two local circuits between the armature a^6 and the back stops a^7 and m, and each closure of the local circuit of the battery b, containing the register, produces an imprint upon the strip b^3, so that the complete signal indicated by the teeth or notches in the break-wheel A is reproduced on the recording-strip b^3.

When the armature a^6 is brought in contact with its back stop m at the first interruption or break in the main-line circuit, the local circuit of the battery b^{10}, containing the time-stamp magnet b^{12} and the electro-magnet c, is closed and the said magnets are energized. The electro-magnet b^{12} when energized attracts its armature b^{15} and causes the time indicated by the dials or time-indicating surfaces c^{12} to be imprinted upon the recording-strip b^3, and at the same time the electro-magnet c attracts its armature c^9 and withdraws the detent-arm c^8 from engagement with the rotary disk c^5, thereby permitting the latter to be revolved in the direction indicated by the arrow thereon by its motor mechanism. When the arm c^8 is withdrawn from engagement with the rotary disk c^5, the tooth c^7 of the said disk is carried away from and out of contact with the movable circuit-terminal c^2, and the latter is withdrawn by its spring c^4 away from the circuit-terminal c', thereby opening the local circuit of the battery b^{10} between the said terminals. The local circuit of the time-stamp magnet b^{12} remains open until the disk c^5 has made a complete revolution, as herein shown, and the tooth c^7 has been again brought into engagement with the movable terminal c^2 to bring the latter into engagement with its co-operating terminal c'.

The speed of rotation of the disk c^5 may be governed by regulating its motor mechanism so that any desired length of time may elapse before the said disk has made a complete revolution, which time, for sake of illustration, may be supposed to be one minute. It will thus be seen that during the minute the circuit-terminal c^2 is removed from engagement with the circuit-terminal c' the local circuit containing the time-stamp magnets b^{12} remains open between the said terminals and may be closed by the armature a^6 being withdrawn into contact with its back stop a^7 without affecting the operation of the time-stamp, and consequently a number of signals may be transmitted and recorded upon the tape b^3 before the local circuit is again closed by the tooth c^7 acting on the circuit-terminal c^2.

With the apparatus in the condition represented in the drawing the time is stamped at the first impulse or break of the main-line circuit, and will not be again stamped until the circuit-terminal c^2 has been brought into engagement with the circuit-terminal c' by the rotary mechanical circuit-controller, and the next operation of the time-stamp may be effected by an impulse or break in the middle of a signal transmitted by the wheel A, or by any other break or impulse, according to which impulse is being transmitted when the

rotary circuit-controller has been restored to its normal position.

I have herein shown the rotary circuit-controller or disk c^5 as provided with one tooth, which requires that the disk c^5 shall make a complete revolution before the local circuit is again closed between the terminals c' c^2; but it is evident that the disk c^5 may be provided with any desired number of teeth c^7, according to how long it is desired the local circuit should be open between the terminals c' c^2 before being again closed.

I claim—

1. In a signaling system, the combination of the following instrumentalities, viz: a main electric circuit, a signal-transmitting mechanism included therein, a relay or receiving mechanism a^2 in said circuit, a local circuit controlled by said relay, a register in said local circuit, a time-stamp provided with an electro-magnet, a second local circuit controlled by the relay a^2 and independent of the register local circuit and in which the electro-magnet of the time-stamp is located, two sets of circuit-terminals for the local circuit of the time-stamp, one set of circuit-terminals being controlled by the relay, a rotary mechanical circuit-controller to govern the operation of the second set of circuit-terminals, and an electro-magnet to govern the operation of the said mechanical circuit-controller, substantially as described.

2. In a signaling system, the combination of the following instrumentalities, viz: a main electric circuit, a signal-transmitting mechanism included therein, a relay or receiving mechanism in said circuit, a local circuit controlled by said relay, a registering mechanism in said local circuit, a second local circuit controlled by the relay, a time-stamp having its electro-magnet included in said second local circuit, circuit-terminals for said local circuit, a circuit-controller to operate said circuit-terminals, and an electro-magnet in the local circuit of the time-stamp magnets to govern the operation of the said circuit-controller, substantially as described.

3. In a signaling system, the combination of the following instrumentalities, viz: a main electric circuit, a signal-transmitting mechanism included therein, a relay or receiving mechanism in said circuit, a local circuit containing a register-operating magnet b', a recording strip or tape upon which the signal transmitted is received, a second local circuit controlled by the said relay, time-operating magnets located in said local circuit, normally-closed circuit-terminals in said local circuit, a circuit-controller co-operating with the said circuit-terminals to hold the same normally closed, and an electro-magnet in the local circuit of the time-operating magnets governing the operation of the circuit-controller, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

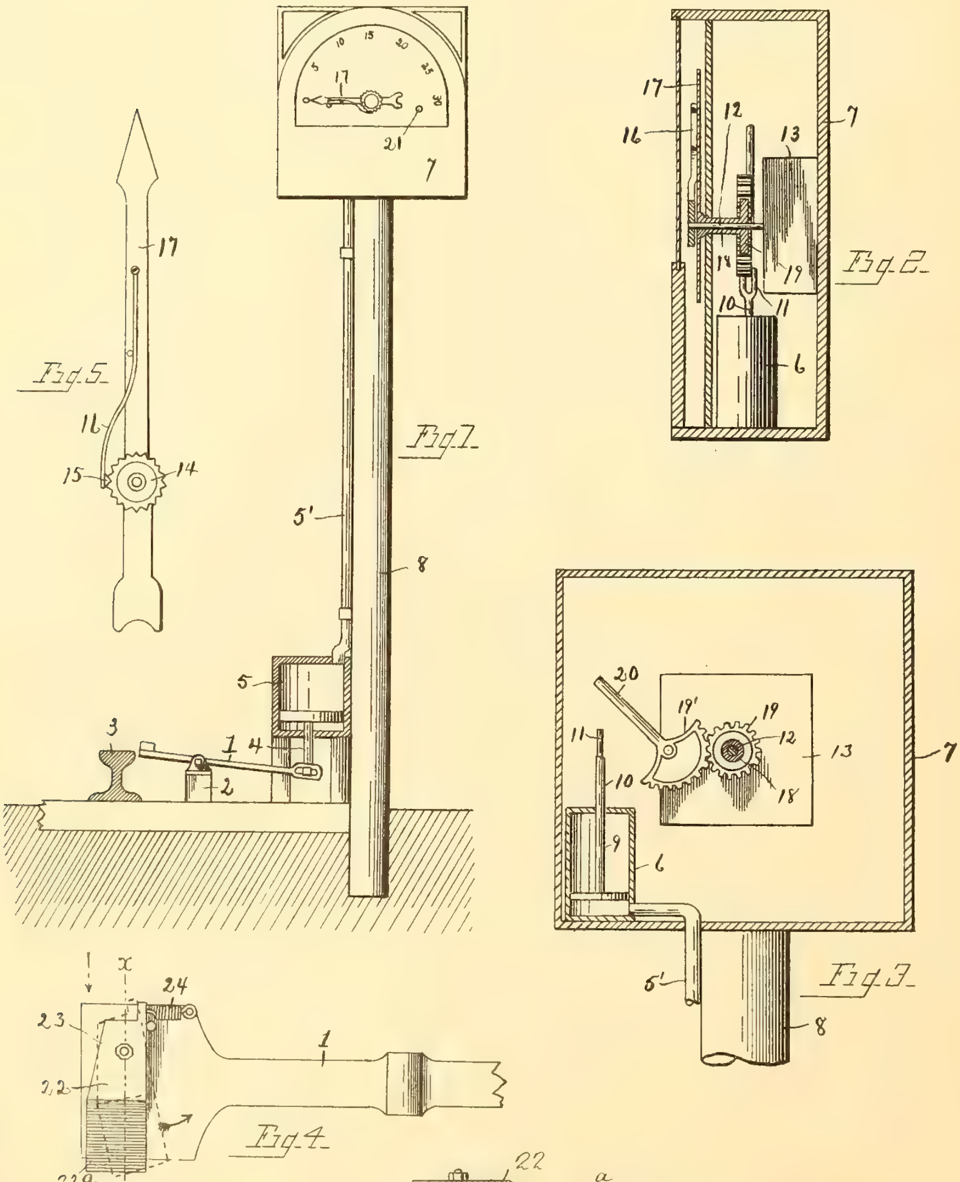
HENRY A. CHASE.

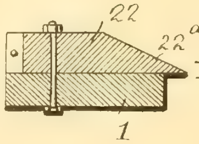
Witnesses:
JAS. H. CHURCHILL,
SADIE C. FEARING.

(No Model.)

A. H. THORP.
RAILWAY TIME SIGNAL.

No. 481,723. Patented Aug. 30, 1892.





WITNESSES

Carroll J. Webster.

[illegible]

INVENTOR

Adelbert H. Thorp

By William Webster

Atty.

UNITED STATES PATENT OFFICE.

ADELBERT H. THORP, OF TOLEDO, OHIO.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 481,723, dated August 30, 1892.

Application filed September 26, 1891. Serial No. 406,960. (No model.)

To all whom it may concern:

Be it known that I, ADELBERT H. THORP, of Toledo, county of Lucas, and State of Ohio, have invented certain new and useful Improvements in a Railway Time-Signal for Indicating the Movement of Trains; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form part of this specification.

My invention relates to a railway time-signal for indicating the movement of trains, and has for its object to provide a simple, correct, and automatically-operated indicator for indicating the interim elapsing between the passage of trains at the given point.

A further object is to provide a mechanism for this purpose that shall preclude the possibility of mistake by reason of carelessness and that shall be inexpensive of construction.

The invention, in a broad sense, comprehends a time-signal operated by a passing train which actuates an indicator registering a minimum period of time, which mechanically indicates the period of time that may elapse between the passage of the same and the arrival of a preceding train, with means for adapting the same for use upon a single track.

It is well known that a great majority of the accidents occur in the movement of trains by reason of the carelessness or incompetency of operators intrusted with the running of trains. It becomes necessary in view of this fact that there shall be mechanical means employed for this purpose that shall correctly indicate the distance or time existing between trains moving in the same direction. In order to accomplish this result, there must be a minimum period indicated by the first train and mechanism for indicating a maximum time between the first and succeeding train, which second train must change the indication heretofore existing and indicate a new and minimum period, this relation and operation to exist and succeed, respectively, at the passage of each train. It is also necessary that there should be a provision for allowing the passage of a train in an opposite direction without affecting the indicator. I have accomplished these results by the mechanism hereinafter described.

In the drawings, Figure 1 is a front elevation of an indicator constructed in accordance with my invention, the air-compressor being shown in section to disclose the interior thereof. Fig. 2 is an edge or side view, in vertical section, of the indicating mechanism. Fig. 3 is a longitudinal vertical sectional view of the same with the front casing and dial removed to disclose the interior mechanism. Fig. 4 is a detail view of the actuating-lever, showing a pivoted spring-actuated bearing-plate for contacting with the wheel-tread in order to operate the indicator by the passage of a train in one direction and allow the lever to remain intact upon the passage of a train in a reverse direction. Fig. 5 is a top plan view of the pointer with the ratchet and spring-pawl attached. Fig. 6 is a sectional view of the actuating-lever and bearing-plate, taken on the line $x\ x$ of Fig. 4.

1 designates a lever fulcrumed upon a pedestal 2, the outer end of the lever extending in close proximity to the rail 3, the opposite end being connected with a piston 4, fitting tightly within a cylinder 5, from which there extends a vertical pipe 5′, which enters a cylinder 6, sustained in a casing 7, mounted upon a pole 8. Cylinder 6 has fitting tightly therein a piston 9, having a stem 10, forked at its upper end, as at 11, for a purpose hereinafter described.

12 designates a shaft actuated by a clock-gearing located within a casing 13, secured within casing 7. The clock mechanism being of the ordinary character, preferably requiring winding but once in eight days, need not be illustrated or described.

Upon the outer end of shaft 12 there is rigidly secured a ratchet-wheel 14, the teeth of which are of V shape in order to allow the correspondingly-shaped tooth 15 of a spring-pawl 16, secured upon a pointer 17, to ride over the ratchet-teeth when necessary. Pointer 17 is either formed integral with or rigidly secured upon a hollow shaft 18, journaled upon shaft 12 and having a pinion 19 either integral or fixedly secured thereon.

19′ designates a segment of gear journaled in the casing 7 to intermesh with the pinion

19, the said gear being formed with an arm 20, which extends therefrom a sufficient distance to normally rest in the fork 11 of the piston-stem 10.

In operation, a train approaching the signal, as the first wheel contacts with the outer end of lever 1 and depresses the same the inner end is raised accordingly, thereby raising piston 4 and forcing air through pipe 5 into cylinder 6 and raises piston 9, thereby through the medium of arm 20 and segmental gear 19′ revolving pinion 19 and pointer 17 until it reaches the numeral "1" or "0," the spring-pawl riding over the ratchet-wheel during this operation. As soon as the train has passed lever 1 the pointer moves to indicate the proper time by reason of the clock mechanism with which it is connected, and if no train should pass within thirty minutes the pointer moves to the numerals "30," when it contacts with a stud 21 and remains stationary, the clock, however, still being in operation, thereby causing the spring-pawl to ride over the ratchet-wheel 14. The engineer of the next succeeding train upon approaching the signal observes the location of the pointer and discovers that a period of at least thirty minutes has elapsed since the passage of the last train, and in passing over lever 1 resets the pointer to "1" or "0," when the pointer commences to indicate the time, as has been described, and should the next succeeding train be but two, three, or less minutes behind the train last passed this information is at once conveyed to the engineer by his observing the number of minutes indicated by the pointer upon the dial. It will be seen that the signal is absolutely correct and that each succeeding train is notified of the time that has elapsed since the passage of the preceding train.

It will be evident that I may have a single lever, as described, when each train moves in the same direction, as in the case of a double-track railway; but where there is but a single track I have provided a pivoted bearing-plate 22, whereby when a train is moving in the direction of the portion 22^a parallel with the track (see Fig. 4) it will depress the lever 1, while with a train approaching the opposite way the wheel will first contact with the inclined edge 23 of the plate and move the plate to one side in the direction of the arrow, thereby allowing the train to pass without affecting the signal, the spring 24 causing the bearing-plate 22 to return to its normal position in the path of travel of a train moving in the opposite direction.

The clock mechanism may be wound every eight days by an operative or connected to be run electrically.

It will be readily understood that by my invention I may locate the dial remote from the place where the lever is pivoted by simply extending the pipe therefrom, thereby enabling me to locate the lever at the station within sight of the official in charge and have the signal some distance therefrom, as around a curve or where the station is hidden from view.

What I claim is—

1. In a railway time-signal, two connected air-compressors, one of which has connection with the pivoted lever adapted to operate the same when actuated by a moving train, a clock mechanism, a shaft actuated thereby, having a ratchet-wheel, a pointer having a spring-pawl engaging with the ratchet-wheel, a pinion upon the pointer-shaft, and a gear operated by one compressor to revolve the shaft and return the pointer to its starting-point.

2. In a time-signal, a pointer for indicating time, and mechanism connected therewith and with a lever having one end contiguous to the railway-track, said lever having a spring-actuated bearing-plate adapted to contact with the wheels of a passing train when moving in one direction and yield to the pressure of the wheel when contacted with by a train passing in an opposite direction.

3. In a railway time-signal, an air-compressor, a pivoted lever, one end of which is contiguous to the railway-track, the opposite end engaging the piston of the air-compressor, a clock mechanism having a ratchet-wheel on the outer end of the clock-shaft, a pointer having a shaft journaled on the clock-shaft, a spring-pressed bearing on the pointer bearing on the ratchet-wheel, and a gear-wheel on the opposite end of the pointer-shaft meshing with a segmental gear operated by the piston of an air-compressor, said air-compressors being connected by an air-conduit, substantially as described.

4. In a railway time-signal, an air-compressor actuated by a passing train, another air-compressor and an air-conduit between the two, said air-compressor having an upwardly-extending bifurcated piston-rod, a clock mechanism, a pointer moved thereby, having on its shaft a segmental gear, and a gear-wheel meshing therewith, having an integral arm adapted to rest in the bifurcated portion of the piston-rod and be actuated thereby.

In testimony that I claim the foregoing as my own I hereby affix my signature in presence of two witnesses.

ADELBERT H. THORP.

Witnesses:
WILLIAM WEBSTER,
CARROLL J. WEBSTER.

(No Model.)

2 Sheets—Sheet 1.

F. BENNER.

ELECTRIC GUEST CALL.

No. 481,919. Patented Aug. 30, 1892.

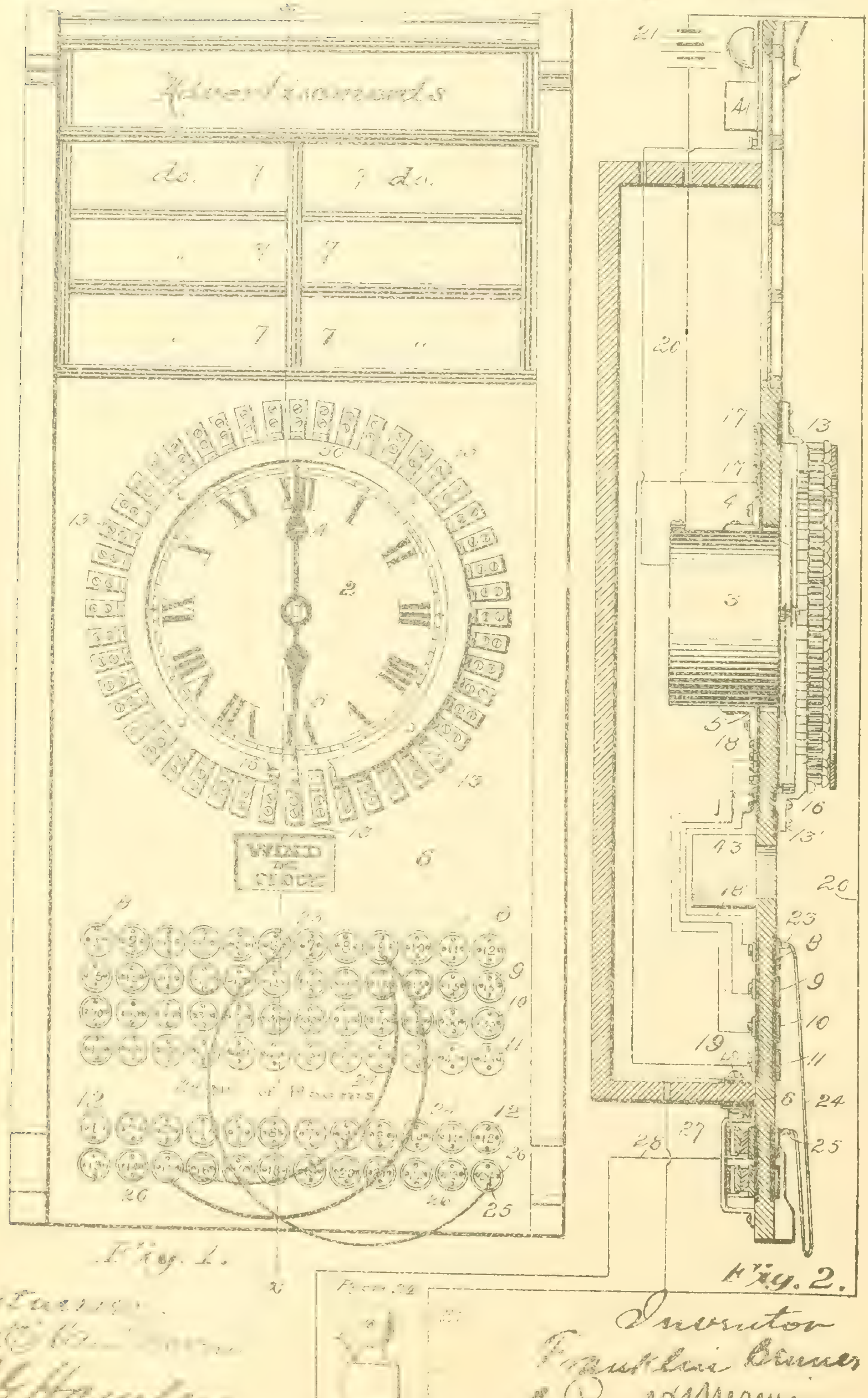


Fig. 1.

Fig. 2.

Witnesses:

O. J. Hawley

Inventor

Franklin Benner

A. Paul & Merwin

his Attorney

(No Model.) 2 Sheets—Sheet 2.

F. BENNER.

ELECTRIC GUEST CALL.

No. 481,919. Patented Aug. 30, 1892.

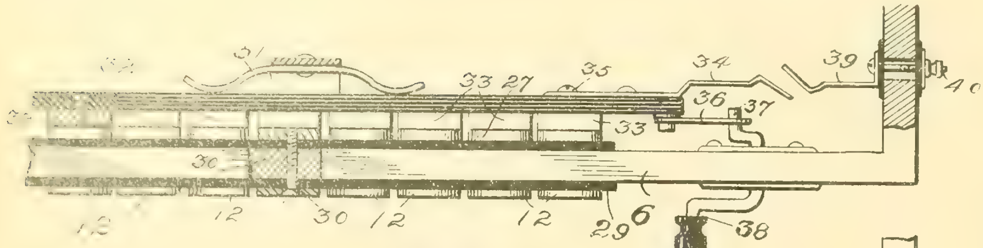


Fig. 3.

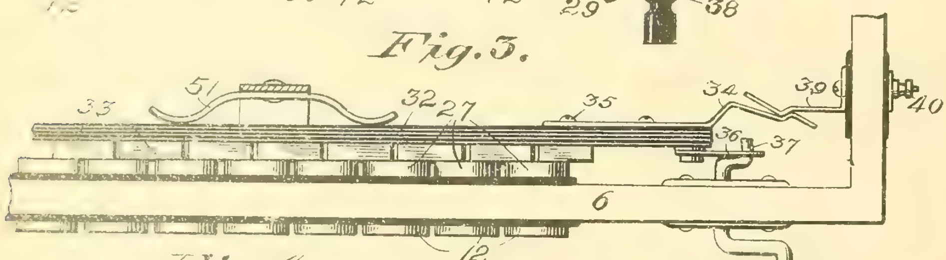


Fig. 4.

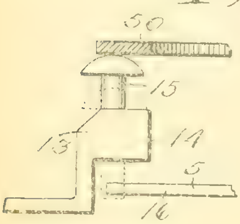


Fig. 5.

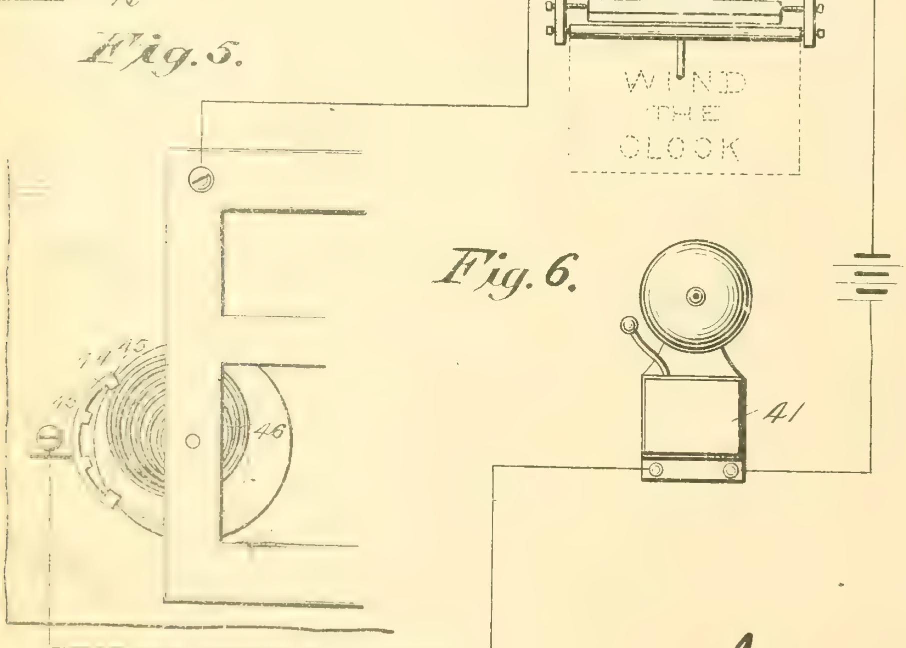


Fig. 6.

Witnesses:
C. E. Van Doren.
O. T. Hawley.

Inventor:
Franklin Benner
By Paul & Merwin
his Attorneys

UNITED STATES PATENT OFFICE.

FRANKLIN BENNER, OF MINNEAPOLIS, MINNESOTA.

ELECTRIC GUEST-CALL.

SPECIFICATION forming part of Letters Patent No. 481,919, dated August 30, 18[illegible].

Application filed October 26, 1891. Serial No. 409,808. (No model.)

To all whom it may concern:

Be it known that I, FRANKLIN BENNER, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain Improvements in Electric Guest-Calls, of which the following is a specification.

My invention relates to guest-calls for hotels, and especially to improvements in that class of guest-calls in which the hands of the clock are employed in making electric connections.

The object of my invention is to simplify and cheapen the construction of such devices and at the same time to render their use thoroughly efficient and reliable.

To this end my invention consists in the construction and combinations hereinafter described, and particularly pointed out in the claims.

My invention will be more readily understood by reference to the accompanying drawings, in which—

Figure 1 is a front view of a guest-call embodying my invention. Fig. 2 is a vertical cross-section thereof on the line $x\,x$ of Fig. 1. Figs. 3 and 4 are enlarged detail views showing the fire-alarm apparatus provided in connection with my device. Fig. 5 shows one of the contact segments or brackets employed on the face of the clock. Fig. 6 is a diagrammatic representation of an annunciator in connection with several other parts of the guest-calls.

As shown in the drawings, the clock face or dial 2 and the clock 3 are of the ordinary construction.

4 and 5 represent the minute and hour hands, respectively. The front 6 of the case is made of wood, so as to insulate the several parts. The upper part of the guest-call is devoted to the advertising-spaces 7 and the lower part to the number and socket plates. The upper sets of these plates indicate the twelve hours of the day and the quarter-sections thereof. The plates 8 in the upper row indicate the even hours from one to twelve, the next row 9 the first quarter or fifteen minutes, and the rows of plates 10 and 11 the thirty and forty five minute sections, respectively. At the bottom of the board I arrange the plates 12, each of which indicates a different room in the hotel. Arranged in a circle around the clock-dial are the contact-segments 13, made in the form of small brackets. (Shown clearly in Fig. 5.) The upper ends [illegible] of these brackets extend inward and are rigid enough to form guides for the contact-pins 15. The insulated ring 30 is arranged to prevent the pulling out of the brackets. When the pins are pushed down into positions corresponding to the dotted position of Fig. [illegible], they come within the path of the contact-brush or spring 16, arranged on the hour-hand. These segments are insulated from one another and each segment is represented on the inside of 6 the guest-call by a small binding-post 17 thoroughly insulated from the others. A wire 18 or other electric connection extends from each binding-post, representing a particular point or time on the clock-dial 3, to a binding-post [illegible] belonging to a corresponding time-plate 8, 9, 10, or 11 on the face of the guest-call. Thus it will be seen that the pin 15 of a particular contact-segment being pushed in—as, for instance, the pin opposite "VI"—a connection is made with the plate marked 6 in the upper row of the time-plates. From the framework of the clock a line 20 extends through a battery 21 to an electric bell 22, situated in a specified room of the hotel. Suppose this room to be "No. 24," the circuit may be traced from the battery to the clock, from thence through the hour-hand and the spring 16 to the pin "six o'clock," contact-segment 13, thence through the board to the binding-post [illegible] thereof, and by the wire 18' to the plate "No. 6" in the row of plates 8. From thence the circuit is traced through the plug 23 and the loop-cord 24 to a similar plug 25, inserted in one of the plug-sockets 26 of the room-plate 24. Current passes thence through to the back of the board and the plate 27 to the strand 28, leading to the bell 22 in the room "No. 24." From the bell the circuit is completed through the line [illegible] to the battery 21 or through a ground connection, [illegible] the bell will be caused to ring until by the movement of the hour-hand the spring 16 is carried past the pin of the segment [illegible] or the pin of the segment next in advance [illegible]

[illegible] so, the spring 16 will strike it [illegible] fifteen minutes after six, and a loop-cord and plugs being connected with the "6.15" time-plate and the plate of a given room the call-bell therein will be rung at that time. In each of the plates or small disks on the board I provide four of the socket-holes 26, so that if necessary four connections may be made from a single plate. As a usual thing, however, only a single plug is provided in connection with each room-plate 12, and the end thereof is preferably permanently secured thereto, so that the cord may not be lost. The particular construction of these plates is shown best in Figs. 3 and 4, in which I also have a fire-alarm device common to all the rooms and by the operation of which the bells in all the rooms may be caused to ring simultaneously and continuously. In these figures the front wall is, for clearness, shown in full lines instead of being sectioned. The plates 12 are fastened directly on the board 6, or, if desired, upon a sheet of insulating material [illegible] by screws 30, passing through the board and fastened in the back plates 27, from which the wires extend to the several call-bells.

For ringing all the call-bells at once I provide the sliding fire-alarm device consisting in the strip 32 of insulating material, preferably hard rubber, and provided with sections 33, normally standing over the several sections 27 and practically forming a part thereof, being preferably insulated from all other parts. The spring 31 presses on the bar 32 and insures good contacts between the back plates and block 33. On the end of the bar 32 I secure the contact-spring 34, having a screw 35, electrically connecting the same with the end section 33. The link 36 is pivotally connected with the end of the bar 32 and the crank 37, which extends through the board 6 and is provided with the handle 38, by means of which the crank may be thrown over into the Fig. 4 position, thereby bridging the sections 33 over the plates 27 and making a continuous path for the current and at the same time snapping the spring 34 under the stationary contact-spring 39, connected with the binding-post 40, which is in turn connected with the battery. Thus it will be seen that the clock is short-circuited and a direct battery connection completed through all the lines and to all of the call-bells to sound the alarm.

One of the chief objections to guest-calls which depend upon the operation of a clock is that the attendants allow the clock to run down, thereby, of course, rendering the whole system inactive. To overcome this objection and compel attention, I provide the annunciator having a drop bearing a sign "Wind the clock," or the like, as shown in Figs. 1 and 7. [illegible] adapted to show through an opening in the board 6, and the construction of the apparatus is shown in Figs. 6 and 7, in which [illegible] Fig. 7 corresponds to the bell 41 of Fig. 2, while the annunciator is supposed to be contained in the box 43 of Fig. 2. A separate bell may be used in connection with this part of the apparatus or connections may be made with the main battery 21. The drop is arranged to fall when the clock runs down. To operate the annunciator at just this time, I provide the contact-bracket 44, insulated from the rest of the clock and provided with several of the lugs 45, with one or two of which the clock-spring 46 when it is fully expanded makes contact, thereby completing the circuit through the frame of the clock to the bell, thence through battery, through the coils 47 of the annunciator, and back to the clock-frame. It is obvious that either in this case or in the other connections of the guest-call grounded circuit might be employed instead of metallic. The annunciator best adapted for my use is shown in Fig. 6, where the electro-magnet, the armature, and the drop-shutter are of the well-known types.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, in a guest-call, of a clock and an hour-hand for the same, provided with a contact-brush or spring 16, with contact-bracket segments 13 arranged about the dial of said clock, movable pins 16, arranged in said bracket and adapted to be pushed through the same into the path of the end of said spring 16, said segments being insulated from one another, and means for connecting the same with call-bells arranged in the several rooms of the building, as described.

2. The combination, with the clock provided with the hour-hand having the contact-spring 16, of the contact-segments 13, having the form of brackets and provided with pins 16, binding-posts for said segments on the back of the insulating-board on which the same are placed, and means for preventing the removal of said pins from said brackets, substantially as and for the the purpose specified.

3. The combination, in a guest-call, of a clock having an hour-hand, with insulated contact-segments arranged about the same and representing the various time-divisions of the clock, contact-pins slidably arranged in said sections, a brush on said hour-hand to engage the same when pushed in, time-plates 8, 9, 10, and 11, arranged upon the face of the call, plug-sockets therein, room-number plates arranged thereon, plugs and cords connected therewith, said plugs adapted to be placed in said sockets, connection from said room-number plates to call-bells, and connections between the time-plates and corresponding contact-segments, substantially as described.

4. The combination, with the room-number

plate, of a bar 32, blocks 33, insularly arranged thereon, back plates 27, screws 30, connecting the same with said number-plates, means for holding said blocks or back plates in contact, springs 34 and 39, said spring 34 connected with one of said blocks, and means for moving said bar to bridge said blocks and plates, substantially as described.

In testimony whereof I have hereunto set my hand this 13th day of October, 1891.

FRANKLIN BENNER.

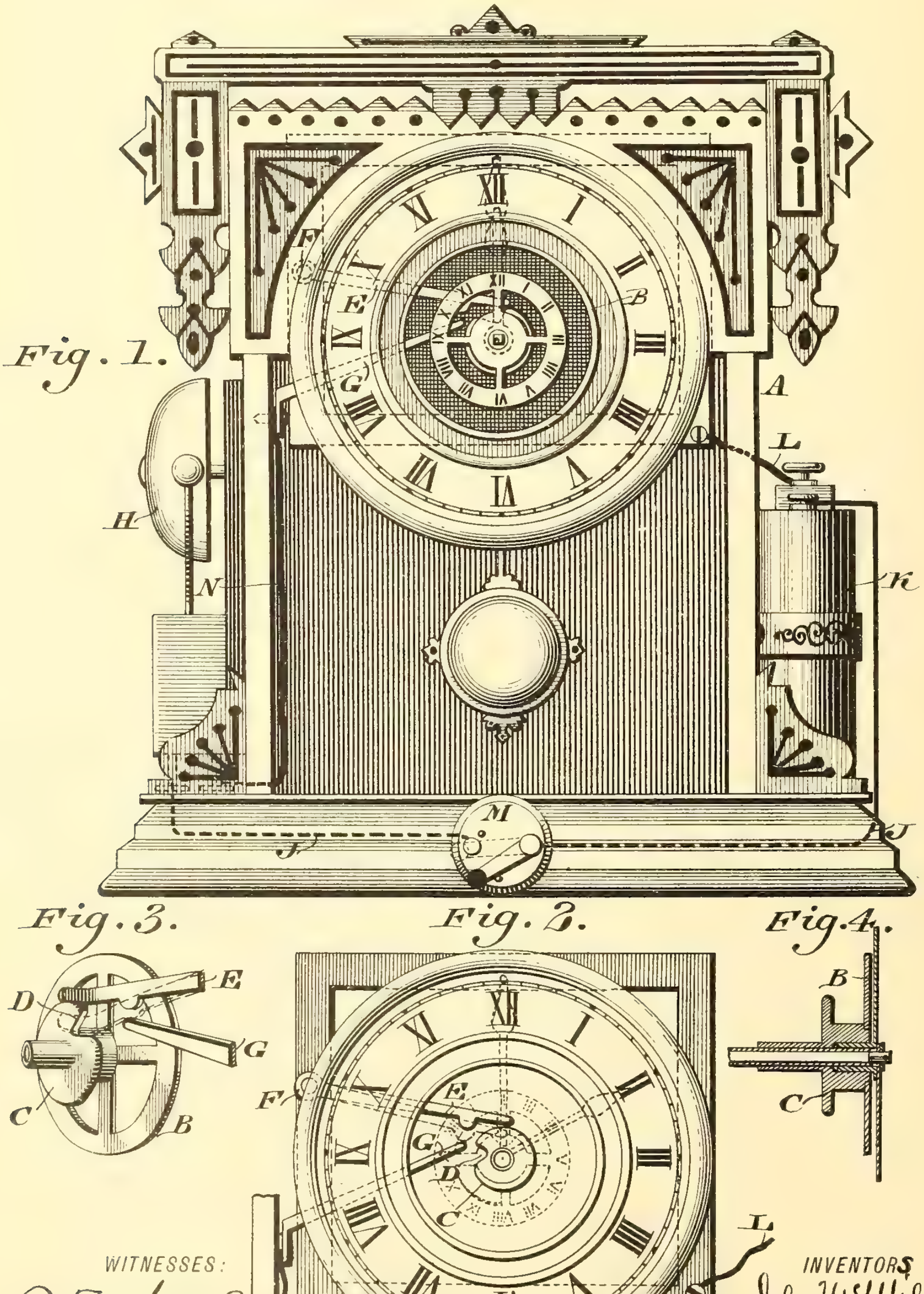
In presence of—
C. G. HAWLEY,
F. S. LYON.

(No Model.)

J. McMILLAN & G. H. TAYLOR.

ELECTRIC ALARM CLOCK.

No. 482,133. Patented Sept. 6, 1892.



WITNESSES:

P. F. Nagle.

L. Douville.

INVENTORS

John McMillan

George H. Taylor,

BY

John A. Wiedersheim,

ATTORNEY.

UNITED STATES PATENT OFFICE.

JOHN McMILLAN AND GEORGE H. TAYLOR, OF PHILADELPHIA, PENNSYLVANIA; SAID TAYLOR ASSIGNOR TO SAID McMILLAN.

ELECTRIC ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 482,133, dated September 6, 1892.

Application filed March 26, 1891. Renewed February 15, 1892. Serial No. 421,635. (No model.)

To all whom it may concern:

Be it known that we, JOHN McMILLAN and GEORGE H. TAYLOR, citizens of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Electrical Alarm Attachments to Clocks, which improvement is fully set forth in the following specification and accompanying drawings.

Our invention consists of an alarm attachment to a clock, the same being in an electric circuit which is closed by the mechanism when the set time arrives, as will be hereinafter described.

Figure 1 represents a front view of a clock having an electric alarm attachment embodying our invention. Fig. 2 represents a front view of a portion thereof. Fig. 3 represents a perspective view of a detached portion. Fig. 4 represents a section of a hand-post and adjacent portions.

Similar letters of reference indicate corresponding parts in the several figures.

Referring to the drawings, A designates a clock which, excepting the features of our invention applied thereto, is of usual construction.

B designates a setting-dial, which is placed on a post or arbor similar to alarm-clocks heretofore in use, said dial carrying a disk C, in the periphery of which is a notch or recess D. Resting freely upon said periphery is an arm E, which is pivoted, as at F, to the frame of the works of the clock.

G designates a finger, which is secured to the clock-casing and projects toward the inner end of the arm E, so that when the latter lowers, as will be hereinafter more fully explained, contact is formed with said finger G.

Supported upon the outside of the casing of the clock or other suitable part thereof is a bell or gong H of the order of an electric bell, the operating mechanism of which is connected by a suitable wire J with a battery K, the latter being also connected with the frame of the works of the clock by a wire L, so that said frame is in electrical communication with the battery.

M designates a switch whose posts are connected with the ends of the wire J for purposes to be explained.

Connected with the finger G is a wire N, which is also connected with the mechanism of the bell H, it being seen that the bell is in an electric circuit.

The dial B is primarily set so that when the recess D arrives at a certain point the alarm will be sounded, it being noticed that when said recess reaches said point the lever or arm E being no longer controlled by the periphery of the disk C, drops into said recess, and thus forms a contact with the finger G, when as the switch M is "on" an alarm is sounded, and the bell will continue to ring until the arm E is again raised by the disk C as it rotates or the switch M is thrown of. It will be seen that the works of the clock are devoid of the alarm mechanism usual in alarm-clocks, excepting, however, the dial B and disk C, it being also evident that said dial and disk may be applied to ordinary clocks, as may also be the arm E, finger G, the battery and bell, the wires and switch, so that such ordinary clocks may be readily converted into alarm-clocks. It is also evident that the bell H, the battery, and switch may be located in an apartment removed from the clock, it only being necessary to support said parts where desired and provide wires of proper length for connection with the respective parts.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. A clock provided with a setting-dial and a recessed disk carried by the same, a gravitating pivoted arm normally in contact with the periphery of said disk, and a stationary finger forming an electric terminal adapted to be contacted by said arm, said arm and finger being in an electric circuit which is closed when said arm and finger contact, substantially as described.

2. An electric alarm attachment to a clock, consisting of a setting-dial with a recessed disk on the hand post or arbor, a gravitating pivoted arm connected with the frame of the works of the clock, a stationary finger forming an electric terminal and supported adjacent to said arm and normally free of con-

tact of said arm, a battery, and a bell, said frame, arm, finger, and bell being in an electric circuit which is closed by contact of said arm with said finger, substantially as described.

3. A clock provided with a setting-dial and a recessed disk carried by and movable with said dial, a gravitating pivoted arm normally in contact with the periphery of said disk, a stationary finger forming an electric terminal adapted to be contacted by said arm, a battery, and a bell, said frame, arm, finger, bell, and battery being in an electric circuit, and a switch for opening and closing said circuit, interposed in said circuit, substantially as described.

JOHN McMILLAN.
GEORGE H. TAYLOR.

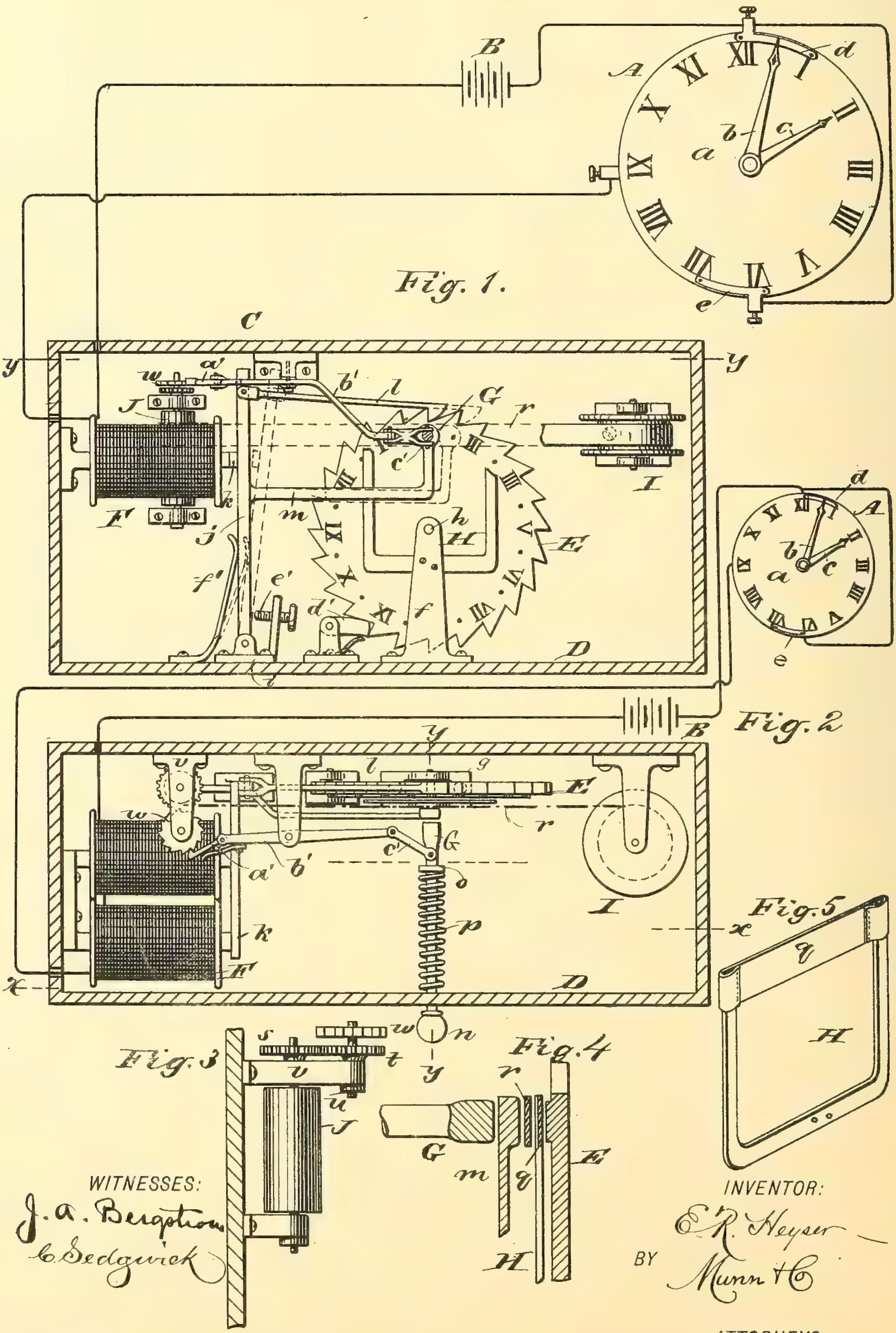
Witnesses:
JOHN A. WIEDERSHEIM,
A. P. JENNINGS.

(No Model.)

E. R. HEYSER.

WATCHMAN'S ELECTRIC TIME RECORDER.

No. 482,251. Patented Sept. 6, 1892.



WITNESSES:

J. A. Bergstrom

C. Sedgwick

INVENTOR:

E. R. Heyser

BY Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

EMANUEL R. HEYSER, OF LEON, MEXICO.

WATCHMAN'S ELECTRIC TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 482,251, dated September 6, 1892.

Application filed March 2, 1892. Serial No. 423,496. (No model.)

To all whom it may concern:

Be it known that I, EMANUEL R. HEYSER, of Leon, Mexico, have invented a new and Improved Watchman's Time-Check, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a side sectional elevation of my improved apparatus, taken on line *x x* in Fig. 2. Fig. 2 is a horizontal section taken on line *y y* in Fig. 1. Fig. 3 is an enlarged side elevation of the paper-moving roll. Fig. 4 is an enlarged vertical transverse section taken on line *y y* in Fig. 2, and Fig. 5 is a perspective view of the ink-ribbon holder.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct a simple and effective watchman's time-check which will indicate the presence or absence of the watchman at a given point at certain intervals of time.

My invention consists in a time movement provided with electric circuit-closing devices for closing the electric circuit at stated intervals, a ratchet-wheel carrying figures representing the hours and dots for the half-hours, electro-magnetic apparatus placed in the circuit of the clock circuit-closer and provided with an armature-lever carrying a pawl for actuating the ratchet-wheel, a spring-actuated printing-bar for pressing the characters upon the printing-surface, means for intermitting the action of the printing-bar, and mechanism for moving the strip upon which the impressions are made, all as will be hereinafter more fully described.

The mechanism for closing the electric circuit of my improved apparatus consists of a clock A, having a dial *a* and hands *b c*, constructed and arranged in the usual way, and the electric contact-strips *d e*, secured to the dial at diametrically-opposite edges and covering a space equivalent to five minutes of time by the clock. The said contact-strips *d e* are insulated from the dial, and being in the path of the end of the minute-hand *b* are each touched once during one revolution of the minute-hand. The contact-strips *d e* are provided with binding-posts and are both connected with one pole of the battery B, the other pole of which is connected with the electro-magnetic check mechanism C, which is connected electrically with the movement of the clock A.

In standard *f*, secured to the bottom of the casing D, is journaled the shaft *h* of the ratchet-wheel E, said ratchet-wheel having on its periphery twenty-four teeth, and upon one side of said ratchet-wheel, opposite alternate teeth, are formed characters corresponding with those on the clock-dial and representing the hours of the day. Opposite intermediate teeth are located projections corresponding with the half-hours.

In one end of the casing D is fixed a magnet F, which is connected electrically with the battery B and with the movement of the clock A. To the bottom of the casing D is attached a plate *i*, to which is pivoted the armature-lever *j*, carrying an armature *k*, which is within the field of the magnet F. The armature-lever *j* is prolonged above the armature *k*, and to the extremity thereof is pivoted a hooked pawl *l*, which engages the ratchet-wheel E. The armature-lever *j* also carries an angled arm *m*, the end of which is enlarged, forming a platen of sufficient size to cover the characters formed on the ratchet-wheel. The arm *m* is rigid in a vertical direction, but is capable of swinging laterally when pressed by the printing-bar G. The said printing-bar G moves in guides in the casing D and one end thereof projects through the front of the casing and is furnished with a knob *n*, by which it may be drawn outwardly preparatory to releasing it for the purpose of printing. On the bar G is placed a collar *o*, between which and the front of the casing D is placed a spiral spring *p*. A forked arm H, secured to the standard *f*, carries an ink-ribbon *q* in front of the ratchet-wheel E and opposite the path of the characters, carried by the wheel. In front of the ink-ribbon is carried a strip *r* of paper, which is taken from a reel I, located at one end of the casing D and wound upon a reel J at the opposite end of the casing. The shaft of the reel J is provided with a spur-wheel *s*, which is engaged by a similar spur-wheel *t* on a shaft *u*, journaled in the arm *v*, which supports the upper end of the reel-shaft. The shaft *u* also carries a ratchet-wheel *w*, which is engaged by a spring-pressed pawl *a'*, pivoted to one

end of the lever b', the other end of the said lever being connected with the printing-bar G by a link c'. The spring-pressed detent-pawl a' engages the ratchet-wheel w and prevents retrograde movement. The armature-lever j is held normally against the limit-screw e' by the spring f', attached to the bottom of the casing and pressing against the said lever.

The operation of my improved apparatus is as follows: When the minute-hand b of the clock A makes a contact with the contact-strip d or e, the circuit of the battery B is closed and the magnet F is energized, drawing forward the armature k, and with it the armature-lever j. This operation moves forward the ratchet-wheel E one notch, bringing a dot or a character opposite the printing-bar G, at the same time bringing the end of the arm m between the said printing-bar and the paper strip r. If under these circumstances the watchman on duty withdraws and releases the bar G by grasping the knob n and releasing it, the impact of the bar upon the enlarged end of the arm m will press the paper strip r against the ink-ribbon q, which in turn is pressed against the projecting dot or character on the wheel E, thus forming on the paper an impression of the said dot or character. If the watchman does not pull the bar G during the time that the circuit of the battery B is closed on the magnet F by the clock A, the pulling of the rod will not produce an impression on the paper, as the armature-lever j is thrown back when the circuit is broken, thereby carrying the arm m out of the path of the bar G, thus preventing the bar G from exerting pressure on the wheel E and intermediate devices. In consequence of this no record can be made, and the paper strip will show a neglect of duty on the part of the watchman. Whenever the bar G is drawn out preparatory to making an impression, the pawl a', through the medium of the link c' and lever b', is made to engage the ratchet-wheel w and turn it, thereby turning the reel J and drawing forward the paper-strip so as to present a new surface for printing. As the electro-magnetic mechanism which turns the ratchet-wheel E is entirely independent of the printing mechanism, the said ratchet-wheel is turned one notch every half-hour, so that when the impressions on the paper do not show the hour and half-hour marks in regular succession the interval of the absence of the watchman from the instrument can be readily determined.

It is obvious that the printing-wheel E may be operated independently of the time-circuit-closing device, as under some conditions a push-button may be substituted for the time-circuit closer. It is also obvious that the time-circuit closer may be usefully employed in other ways. Therefore I do not limit or confine myself to the exact combination or arrangement herein set forth.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In a watchman's time-check, the combination, with a clock and an electrical device connected therewith, of a printing-wheel operated by the electrical device and having its characters on one side, an ink-ribbon in front of the printing-wheel, a strip of paper in front of the ink-ribbon, a printing-bar to be operated by the watchman, and a platen moved in and out of the path of the printing-bar by the electrical device, substantially as described.

2. In a watchman's time-check, the combination, with a clock and an electrical device connected therewith, of a printing-wheel operated by the electrical device and having its characters on one side, an ink-ribbon in front of the printing-wheel, paper-reels mounted to allow the paper to pass in front of the ink-ribbon, a printing-bar to be operated by the watchman, a platen moved in and out of the path of the printing-bar by the electrical device, and means for rotating one of the paper-reels from the printing-bar, substantially as described.

3. In a watchman's time-check, the combination, with a printing-wheel, an inking-ribbon, and paper-reels, of a spring-pressed printing-bar to be operated by the watchman, a platen moved in and out of the path of the printing-bar, and mechanism between the printing-bar and one of the paper-reels for operating the said reel from the printing-bar, substantially as described.

4. In a watchman's time-check, the combination of the ratchet-wheel E, carrying characters representing the hours of the day, the electro-magnetic wheel-operating device consisting of the electro-magnet F, the spring-pressed armature-lever j, provided with the arm m and pawl l, adapted to engage the ratchet-wheel, the spring-pressed printing-bar G, arranged to press upon the arm m, and the electric generator and circuit-closer, substantially as specified.

5. The combination, with the time-printing mechanism, of the reel I, carrying the paper strip r, the reel J for receiving the paper strip, the ratchet-wheel w, the lever b', the spring-pressed pawl a', the link c', and the printing-bar G, substantially as specified.

EMANUEL R. HEYSER.

Witnesses:
RICHARD GUENTHER,
F. E. TRAINER.

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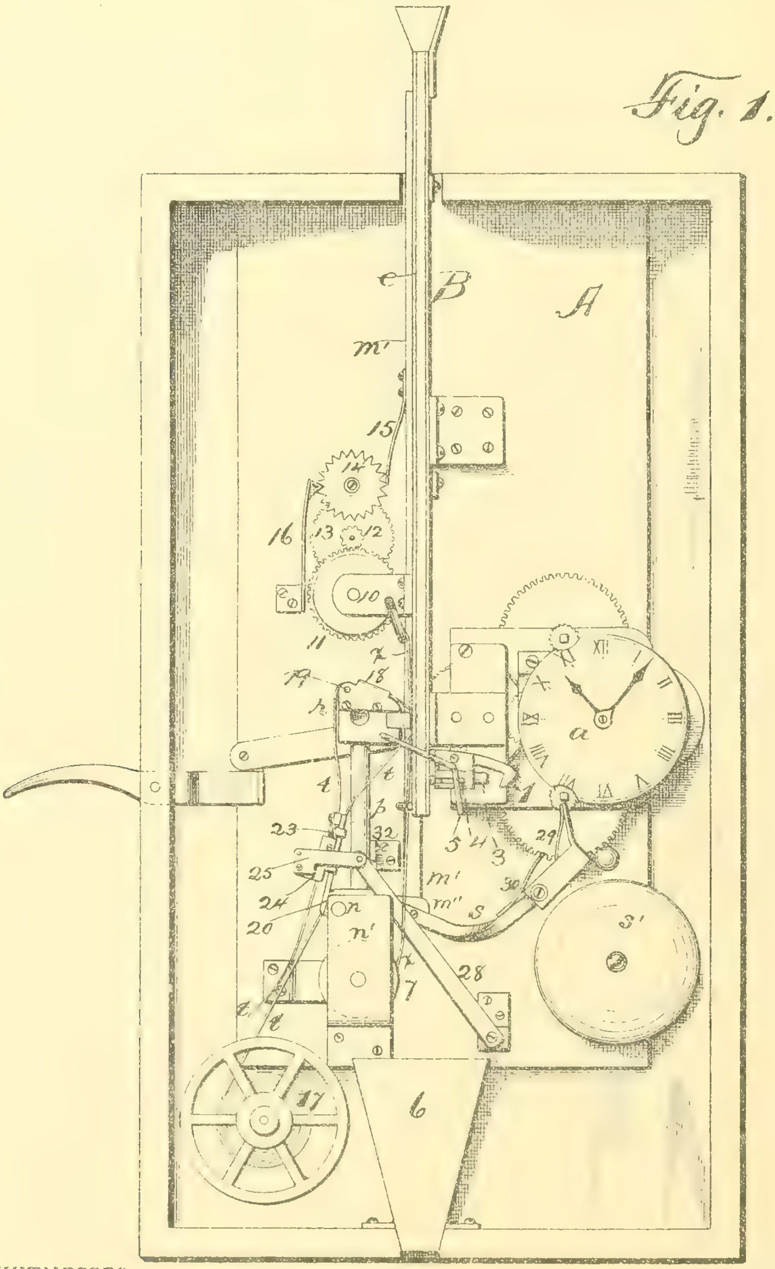
W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293 Patented Sept. 6, 1892.



WITNESSES:

H. A. Carhart

H. E. N Drakes

INVENTOR,

Willard L. Bundy

BY

Smith & Denison

his ATTORNEYS

(No Model.) 6 Sheets—Sheet 2.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293. Patented Sept. 6, 1892.

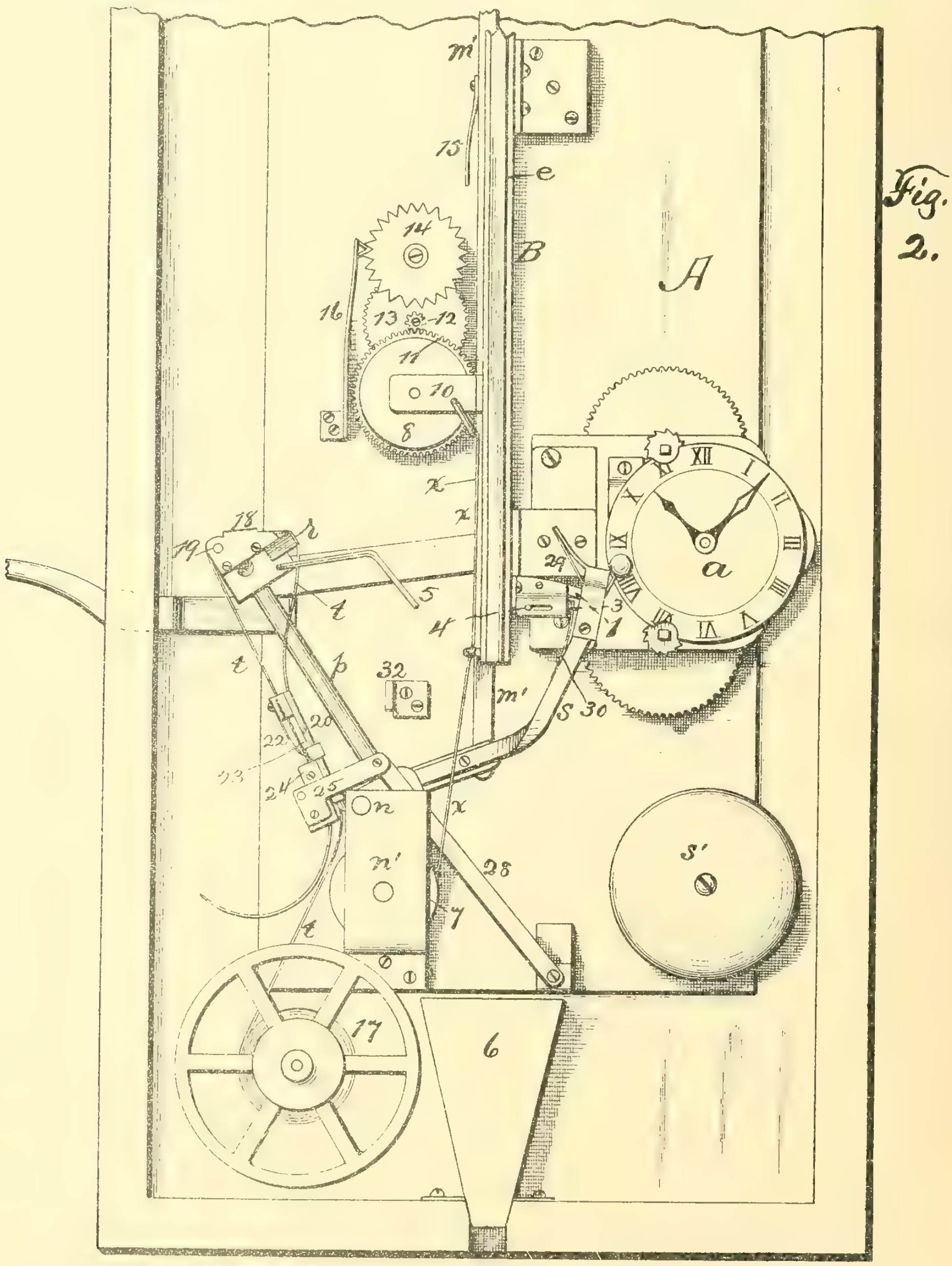


Fig. 2.

Witnesses: Al. A. Carhart

Inventor: Willard L. Bundy

by Smith & Denison, his Attorneys

(No Model.)

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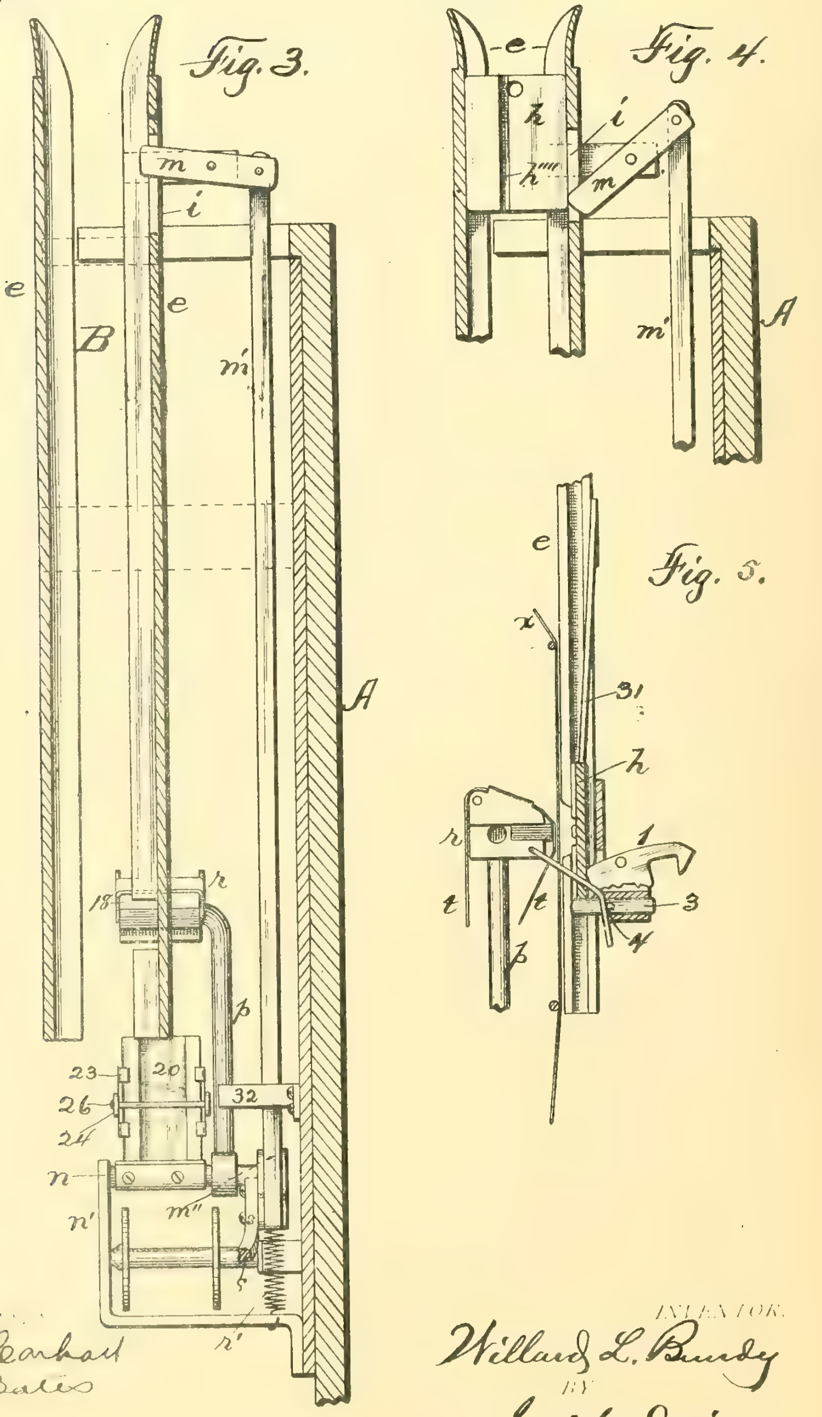
W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293.

Patented Sept. 6, 1892.



H. A. Carhart
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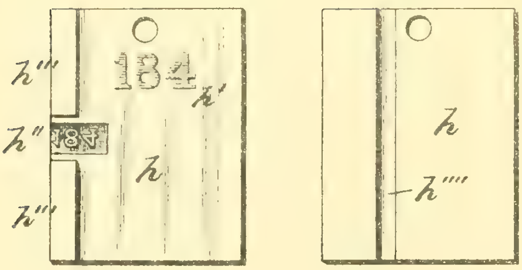
(No Model.) 6 Sheets—Sheet 4

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293. Patented Sept. 6, 1892.



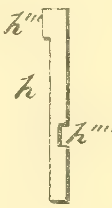
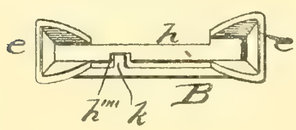


Fig. 6.

Fig. 7.



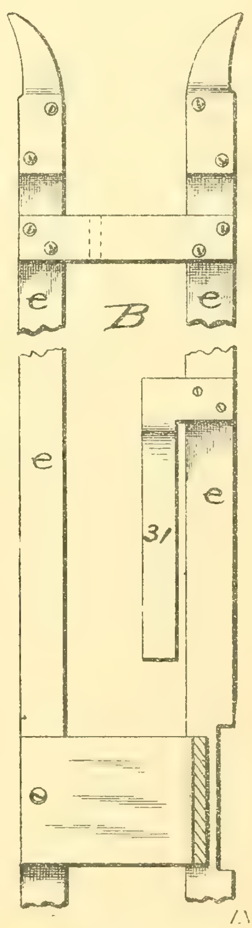
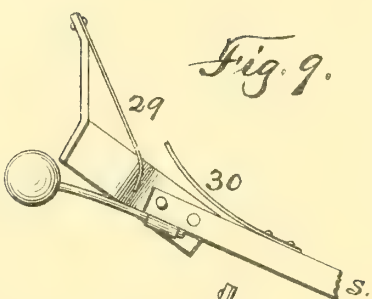


Fig. 8.

Fig. 9.



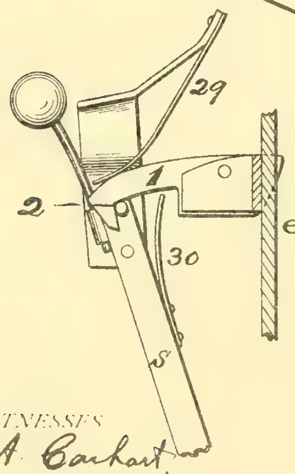


Fig. 10

WITNESSES

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(No Model.) 6 Sheets—Sheet 5.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293. Patented Sept. 6, 1892.

Fig. 11.

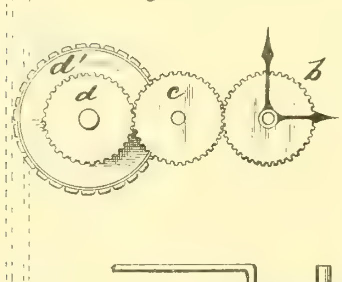


Fig. 12.

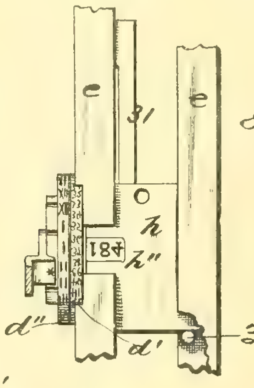


Fig. 13.

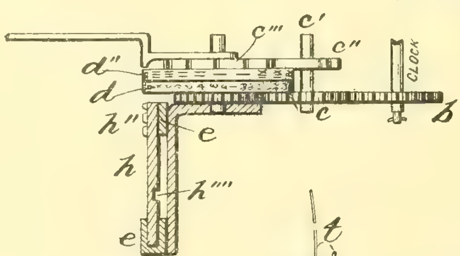


Fig. 14

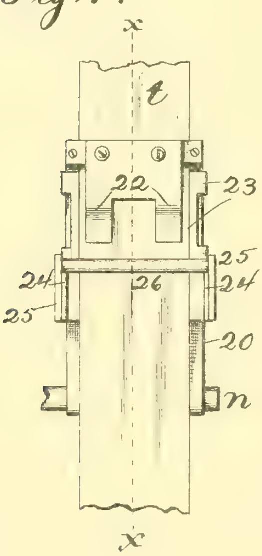
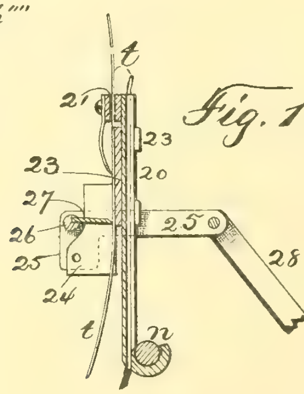


Fig. 15



WITNESSES

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(No Model.) 6 Sheets—Sheet 6.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 482,293. Patented Sept. 6, 1892.

Fig. 16.

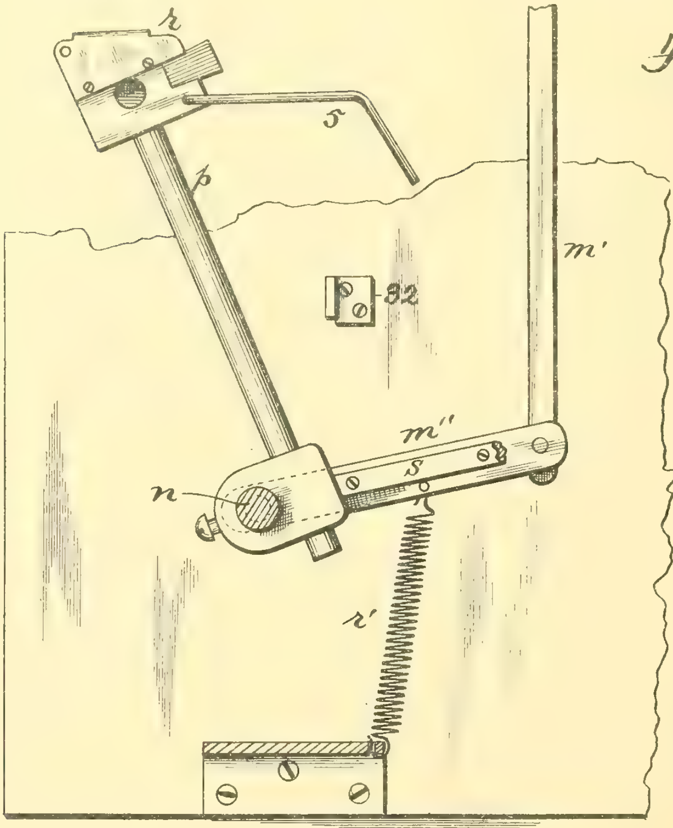
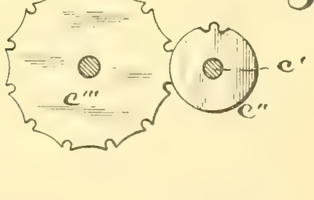


Fig. 17.



WITNESSES:
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G. M. Blowers

INVENTOR.
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UNITED STATES PATENT OFFICE.

WILLARD L. BUNDY, OF BINGHAMTON, NEW YORK, ASSIGNOR TO THE BUNDY MANUFACTURING COMPANY, OF SAME PLACE.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 482,293, dated September 6, 1892.

Application filed March 3, 1892. Serial No. 423,607. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. BUNDY, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Workmen's Time-Recorders, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to workmen's time-recorders; and my object is to simplify the construction and increase the efficiency thereof and to produce a time-recorder in which the printing mechanism is actuated or set by the introduction of a flat check provided with suitable printing characters in relief into a vertical chute; in which the check as it falls through the chute trips the printing alarm mechanism when it reaches the point therein which brings the characters thereon in the printing-line, which is in line with the time-wheels; in which the check is held at the printing-point until the impression is made; in which the check is released simultaneously with the making of the impression and by the impression mechanism; in which the check-holder is set to catch the check by the mechanism which is actuated by the introduction of the check; in which the printing-platen also carries the paper strip and is fed by a mechanism actuated by the vibratory movements of the platen, and in which the ribbon-feed mechanism is actuated by the introduction of the check.

My invention consists in the several novel features, elements, and mechanisms which are hereinafter described, and which are specifically set forth in the claims hereto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the recorder complete in its case, the door being removed, everything being in its normal position ready for the introduction of the check. Fig. 2 is a like view of the same, showing the printing and alarm mechanism set ready by the introduction of the check into the chute and ready to be tripped by the dropping of the same onto the trip. Fig. 3 is a vertical sectional elevation of the check-chute ready for the introduction of the check and an elevation of the impression and paper-feed mechanism as viewed from the right in Fig. 1. Fig 4 is a sectional detail of the top of the check-chute, showing the check partially introduced and in engagement with the lever by which the impression and alarm mechanisms are set and in the position it assumes at the moment when they are so set. Fig. 5 is a sectional detail of the check-chute, the catch which holds the impression and alarm mechanisms in their position when set, the slide which supports the check at the printing-line, the impression-platen, ink-ribbon, and paper strip. Fig. 6 shows the check in front elevation, in rear elevation, and in top plan, respectively. Fig. 7 is a top plan of the check-chute and the check inserted therein. Fig. 8 is an elevation of the check-chute looking from the right in Fig. 1. Fig. 9 is a rear elevation of part of the arm which carries the alarm-hammer and the mechanism thereon. Fig. 10 is a like view of the same, showing the setting-catch in engagement therewith. Fig. 11 is a plan of the train of gearing which actuates the time-wheels. Fig. 12 is a front elevation of part of the check-chute, the check therein, and the time-wheels. Fig. 13 is a sectional detail of the check-chute and the check therein and a top plan of the time-wheels and the gearing actuating them synchronous with the clock. Fig. 14 is an elevation of the paper-feed mechanism looking from the left in Fig. 1. Fig. 15 is a sectional elevation of the same on line $x\,x$, Fig. 14. Fig. 16 is a detail, enlarged, of the crank-arm connected to the platen-carrying bar and the rod actuating it. Fig. 17 is a front elevation of the time-wheels shown in top plan in Fig. 13.

A is the casing, and a is an ordinary clock mechanism, upon the hour-hand part of which the gear b is mounted, in engagement with the gear c, which is in engagement with the gear d upon the side of the time-wheel d', indicating the minutes by the number upon its periphery.

The gear c is mounted upon the shaft c', which also carries a gear c'', in differential engagement with the gear c''' upon the side of the hour-wheel d'', the gear c'' having one tooth and the gear c''' having twelve, so that every full rotation of the gears c and c'' rotates the gear c''' and the hour-wheel the dis-

tance of a single tooth on the gear c''' on one hour upon the hour-wheel.

B is the check-chute, consisting of two parallel bars grooved longitudinally and mounted in an upright position in the casing and extending through its top, and h is the check, which is of such width and thickness as to fit loosely in the chute. This check consists of a plate of metal provided upon its front face with a designating-number h' and at one side with a raised or embossed printing-number h'', the rib h''' on that edge being broken away, as shown, and upon the back provided with a longitudinal guide-groove h''''. A short vertical fin or rib k is secured on one side of the chute and projects into it, and when the check is inserted it fits into the guide-groove on the back thereof and guides it, and also insures the proper insertion of the check with the printing-number on the proper side.

A slotway i is cut in one side of the check-chute, and a pivotally-mounted lever m projects through it into the check-chute, so that the edge of the check engages with it and pushes that end down as the check is pushed into the chute, as shown in Fig. 4, and this raises the connecting-rod m', the lower end of which is connected to the crank-arm m'', which is secured upon the rock-shaft n, which is journaled in the frame n' and the back of the casing, as shown in Fig. 3. The arm p is also secured upon said shaft and upon its upper end carries the impression-platen r, so that when the connecting-rod m' is pulled up, as aforesaid, it partially rotates the shaft n and throws the platen away from the side of the chute, as shown in Fig. 2, and r' is the retracting-spring which gives the impulse to the platen to strike a quick blow to make an impression. Upon the crank m'' an arm s is secured, carrying a hammer upon its outer end, and therefore when the rod m' is raised, as aforesaid, said hammer is raised away from the bell s' and the spring r' causes it to strike a single blow upon the bell. Upon an arm upon the side of the check-chute I pivot a hook 1, the opposite end of which projects into the check-chute, Fig. 10, so that the dropping check strikes it and depressing this end raises the hook, Fig. 5. When the rod m' is raised and the arm s with it, the hook 1 engages with the pin 2 upon this arm, Fig. 10, and this holds the platen and hammer in the position shown in Fig. 2. Then when the check drops and throws up said hook out of its engagement with said pin both the platen and hammer are released to make the impression and give the alarm. When the check has thus unlocked the platen and hammer, it rests upon the sliding stop 3, and the figures h'' thereon are then in the printing-line. This stop is suitably mounted alongside of the hook 1 and is provided with a slide-pin 4, which extends out beyond the edge of the chute, and an arm 5, secured to the platform, Figs. 1 and 2, is adapted to engage with this pin just as the platen is making an impression and force said stop back and release the check, which then drops from the chute into a receiver 6.

The ink-ribbon x is wound upon the spool 7, journaled in the frame n', and the reel 8, which is secured upon a shaft 9, journaled in a bracket 10, secured upon the chute and in the back of the case. A gear 11 is secured upon this shaft, meshing with the pinion 12, secured upon the gear 13, which meshes with a pinion (not shown) secured upon the shaft which carries the star-wheel 14.

An arm 15 is secured upon the rod m' and is raised therewith when the check is inserted, and then when the rod is retracted, as aforesaid, the end of said arm will engage with a tooth of the star-wheel and rotate it one tooth, and thus through the train of gearing rotate the reel to wind the ribbon thereon from the spool and feed it. A spring-pawl 16 engages with the teeth of said star-wheel.

A paper-reel 17 is mounted in the bottom of the case, and the paper strip t extends from it up through the paper-chute, across the face of the platen, through a loop 18 across its top, over a roller across its back corner, mounted upon a shaft 19, and thence down through the sliding feed mechanism. The paper-chute 20 is simply a flat tube of metal secured upon the rock-shaft n.

The feed mechanism comprises a loop 21 on the side of the chute, through which the paper passes, fingers 22, secured thereon, the toothed ends of which engage with the paper, a plate 23, having part of its edges bent around the edges of the paper-chute and free to slide thereon, side walls 24, formed by bending the lower edges of said plate outward, a frame 25, pivotally mounted upon these walls and provided with a cross-beam 26, bearing a grip-plate 27, Fig. 15, secured thereto, and a rod 28, pivotally connected to one corner of the frame and to the back of the case. Then when the rock-shaft n is rotated, as aforesaid, the rod 28 will first cause the frame to rock upon the slide 23, bringing said grip against the paper and gripping it against the slide, and as the movement continues said rod will draw the slide down, pulling the paper with it, and when the platen strikes the blow the grip is released from the paper and held by the fingers 22 against retraction.

Upon the hammer-bar I mount a spring 29 in such manner that it will bear upon the hook 1 when it is in engagement with the pin 2 and hold it in engagement, as shown in Fig. 10. Upon the hammer-bar I also secure a spring 30 in such manner that when the hammer-arm is raised by the introduction of the check it will come into contact with the check-stop 3 and force it into position to operate as a stop, as shown in Fig. 5 and also in Fig. 2.

A spring 31 is secured upon the check-chute, with its lower end projecting into it in such manner that a check will readily pass it downward; but after it has been sprung out above the check the latter cannot be with-

drawn, then being beyond the control of the workman. This also prevents fraud by a workman and false registering, as could be done without this spring-finger in that he could attach a wire or cord to the check, drop it down to the printing-point, make the impression from it, and then pull it back out through the top of the chute. An arm 52 is secured upon the back of the case, and it projects outwardly in such manner that the platen-arm engages with or strikes against it in such a way as to cause said arm after it has been set and released as aforesaid, to spring forward and strike an impression blow and then rebound and throw the platen away from the printing-line.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a workman's time-recorder, a check, in combination with a check-chute, a lever projecting into it, a rod connected to said lever, a rock-shaft, and a crank-arm thereon to which said rod is connected.

2. In a workman's time-recorder, a check, in combination with a check-chute, a lever projecting into it, a rod connected to said lever, a rock-shaft, a crank-arm thereon to which said rod is connected, and an impression-platen mounted upon an arm secured to said rock-shaft.

3. In a workman's time-recorder, a check, in combination with a check-chute, a lever projecting into it, a rod connected to said lever, a rock-shaft, a crank-arm thereon to which said rod is connected, a hammer-rod secured to said crank-arm, and a bell.

4. In a workman's time-recorder, a check, in combination with a check-chute, a lever projecting into it, a rod connected to said lever, a rock-shaft, a crank-arm thereon to which said rod is connected, an impression-platen mounted upon an arm secured to said rock-shaft, a hammer-rod secured to said crank-arm, and a bell.

5. The combination, with the impression-platen, of a rock-shaft to which it is connected and means to rotate said crank-shaft, actuated by the insertion of a check into the check-chute.

6. The combination, with the impression-platen and the hammer-rod and bell, of a rock-shaft to which they are connected and means to rotate said shaft by the insertion of a check into the check-chute.

7. In a workman's time-recorder, a rock-shaft, an impression-platen connected thereto, a hammer-rod also connected thereto, and means to rotate said shaft, and a check-chute, in combination with a trip-hook mounted upon said chute and adapted to engage with a pin upon said hammer-rod when said rock-shaft is rotated.

8. In a workman's time-recorder, a rock-shaft, an impression-platen connected thereto, a hammer also connected thereto, and means to rotate said shaft, and a check-chute, in combination with a trip mounted upon said chute and provided with a hook upon one end, adapted to engage with said hammer-rod when said rock-shaft is rotated, and having a trip-arm upon the other end, projecting into the chute and with which a check engages to disengage said hook.

9. In a workman's time-recorder, a rock-shaft and means to rotate it and an impression-platen connected thereto and provided with a lateral arm, in combination with a sliding stop adapted to project into the check-chute and with which said arm is adapted to engage to withdraw it from the chute.

10. In a workman's time-recorder, a rock-shaft, a hammer-rod connected thereto, and a spring-finger thereon, in combination with a sliding stop with which said finger engages when said rock-shaft is rotated.

11. In a workman's time-recorder, a check-chute, a check, a ribbon-reel mounted upon a shaft, and a train of gearing operatively connected to said shaft, in combination with a vertically-moved rod and a finger thereon adapted to engage with the terminal gear when said rod is operated by the passage of the check through the chute.

12. In a workman's time-recorder, a rock-shaft, a paper-chute secured thereto, a slide upon said chute, a rocking frame mounted upon said slide, a grip upon said frame, and means to rock said frame when said shaft is rotated, in combination, as set forth.

13. In a workman's time-recorder, a clock, time-wheels synchronous therewith, a rock-shaft, and an impression-platen connected thereto and actuated thereby, in combination with a check-chute, a rod connected to said rock-shaft, a lever connected to said rod and projecting into the check-chute, and a check operatively engaging with said lever to rotate said shaft when inserted into said chute.

14. In a workman's time-recorder, a check, a check-chute, and a sliding stop holding the check upon the printing-line, in combination with an impression-platen thrown away from the chute by the insertion of the check into the chute and an arm upon the platen engaging said stop to release said check at the same moment that the impression-blow is given by the platen.

In witness whereof I have hereunto set my hand this 13th day of February, 1892.

WILLARD L. BUNDY.

In presence of—

HOWARD P. DENISON,

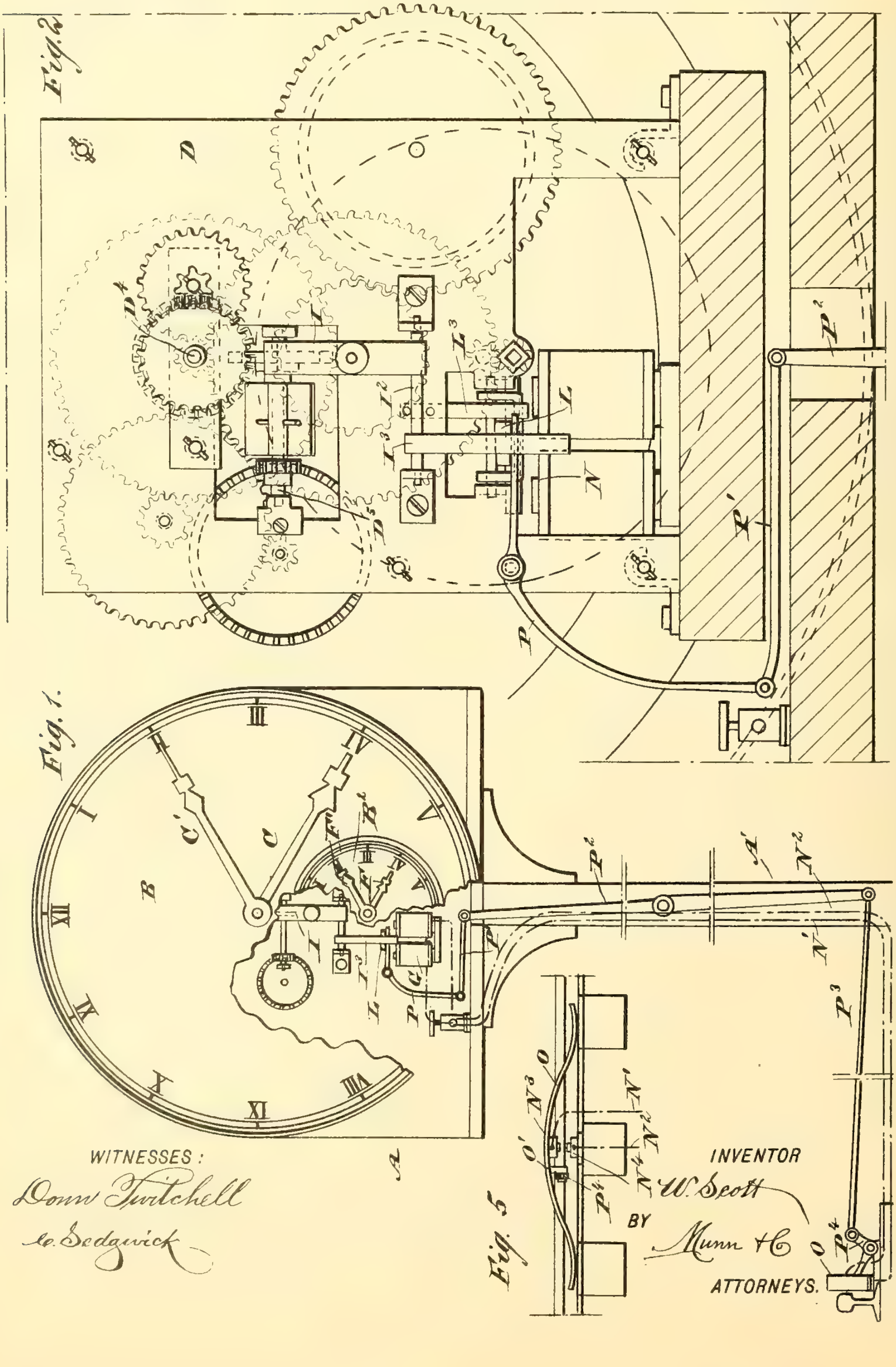
C. W. SMITH.

(No Model.) 2 Sheets—Sheet 1.

W. SCOTT.

RAILWAY TIME SIGNAL.

No. 482,699. Patented Sept. 13, 1892.



WITNESSES:

Donn Twitchell

C. Sedgwick

INVENTOR

W. Scott

BY

Munn & Co

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. SCOTT.

RAILWAY TIME SIGNAL.

No. 482,699. Patented Sept. 13, 1892.

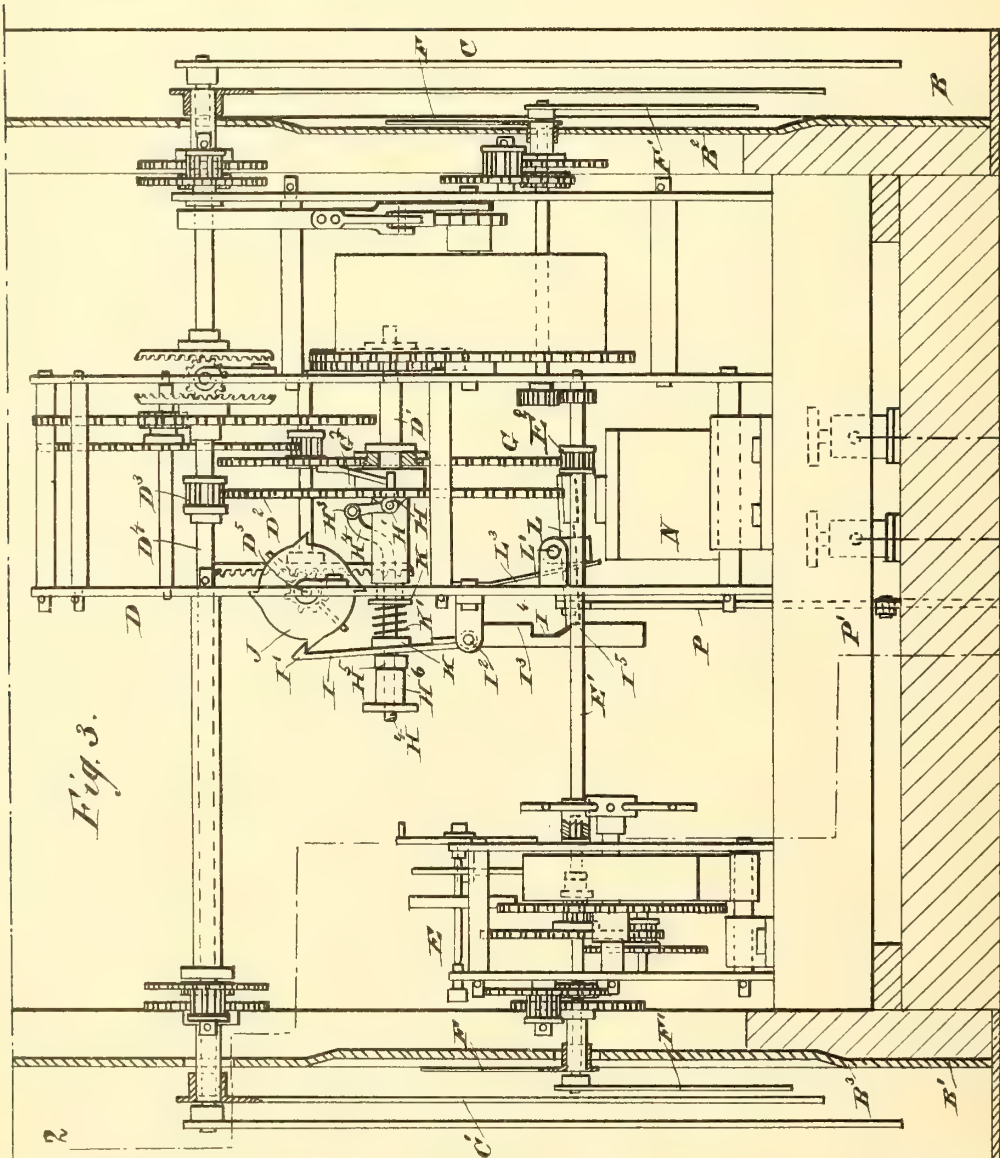


Fig. 3.

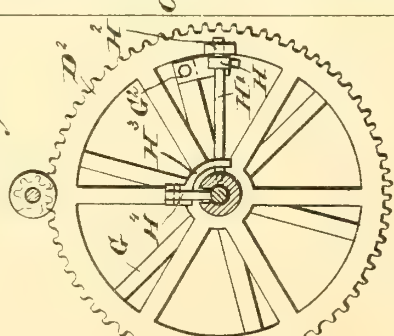


Fig. 4

WITNESSES:

Donn Twitchell

C. Sedgwick

INVENTOR

W. Scott

BY

Munn & Co

ATTORNEYS.

THE NORRIS PETERS CO., PHOTO-LITHO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WALTER SCOTT, OF HOT SPRINGS, SOUTH DAKOTA.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 482,699, dated September 13, 1892.

Application filed May 13, 1892. Serial No. 432,872. (No model.)

To all whom it may concern:

Be it known that I, WALTER SCOTT, of Hot Springs, in the county of Fall River and State of South Dakota, have invented a new and Improved Railway Time-Signal, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved railway time-signal which is simple and durable in construction, very effective and automatic in operation, and arranged to positively and accurately record the time when a train passes the track on which the device is applied.

The invention consists of a time-clock provided with a stopping mechanism for an auxiliary clock adapted to be released by an electro-magnet releasing mechanism of especial construction.

The invention also consists of certain parts and details and combinations of the same, as will be fully described hereinafter, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of the improvement as applied and with parts broken out. Fig. 2 is an enlarged sectional rear elevation of the improvement on the line 2 2 of Fig. 3. Fig. 3 is a transverse section of the same. Fig. 4 is a face view of the connection between the two blocks, and Fig. 5 is a side elevation of a spring-plate arranged alongside the track for making the electric contact.

The improved railway time-signal is provided with a suitably-constructed casing A, supported on a post A′, arranged alongside the track, as is plainly indicated in Fig. 1. The ends of the casing A are provided with the dials B and B′, on which indicate the hour and minute hands C C′, respectively, actuated by an auxiliary spring-actuated clock mechanism D, arranged within the casing A. Within the casing A is also located a second clock mechanism E, actuating two sets of minute and hour hands F and F′, somewhat smaller in size than the sets of minute and hour hands C C′ and indicating on the smaller dials B^2 and B^3, formed within the dials B and B′, respectively, as will be readily understood by reference to Figs. 1 and 3.

On the minute-shaft E′ of the clock mechanism E is secured a pinion E^2, in mesh with a gear-wheel G, mounted to rotate loosely on a shaft D′, forming part of the auxiliary clock mechanism D and carrying a gear-wheel D^2, in mesh with a pinion D^3, secured on the minute-shaft D^4 of the said auxiliary clock mechanism D.

On the inner face of the loose gear-wheel G is formed a spring-arm G^2, on which is adapted to abut one end of an arm H, secured on a shaft H′, mounted to turn in suitable bearings on one face of the gear-wheel D^2, previously mentioned, the said shaft extending radially from the hub of the wheel D^2, in which one end of the shaft has its bearing, the outer end of the shaft having its bearing in a box H^2, attached to the rim of the said wheel D^2. (See Fig. 4.)

Near the inner end of the shaft H′ is secured an arm H^3, extending approximately at right angles to the arm H and pivotally connected with a rod H^4, fitted to slide transversely in the hub of the gear-wheel D^2. The outer end of the rod H^4 is formed with a screw-thread, on which screws a nut H^5, adapted to be locked in place by a jam-nut H^6.

On the face of the nut H^5 rests a lever I, extending vertically and formed at its upper end with a hook I′, adapted to engage a tooth on a stop-wheel J, secured on the shaft D^5 of the wind-wheel of the auxiliary clock mechanism D.

On the lever I, opposite the nut H^5, presses a collar K, on which rests one end of a spring K′, coiled on the rod H^4 and resting at its other end on a fixed part of the frame of the auxiliary clock mechanism D. The spring K′ presses on the collar K, so as to hold the lever I in contact with the nut H^5. The lever I has its pivot I^2 mounted in bearings attached to the framework of the auxiliary clock mechanism D, and from the said pivot extends downward an arm I^3, formed at its inner edge with a notch I^4, the bottom of which is inclined, as at I^5, and is adapted to engage the outer end of the armature-lever L of electro-magnets N, located within the casing A. The armature-lever L is pivoted at L′ in the frame

of the auxiliary clock mechanism D, and is held off the cores of the electro-magnets by a spring L^3. (Shown in Figs. 2 and 3.)

The electro-magnets N are connected by the usual wires N′ and N^2 with contact-points N^3 and N^4, respectively, of which the contact-point N^4 is located on one of the ties of the railroad-track, while the other contact-point is formed on the under side of a spring-plate O, arranged alongside one of the track-rails and adapted to be engaged by the flange of the passing car-wheel, so that when this takes place the spring-plate O is pressed downward and the contact-points N^3 and N^4 are moved in contact with each other to establish an electric circuit in the magnets N.

The armature-lever L is loosely engaged at its under side and near the outer end by one end of a bell-crank lever P, pivoted on the framework of the auxiliary clock mechanism D, the said bell-crank lever being pivotally connected by a link P′ with a lever P^2, pivoted on the post A′. The lower end of the lever P^2 is connected by a link P^3 with a bell-crank lever P^4, pivotally connected with a lug O′, formed on the under side of the spring-plate O, at one side of the contact-point N^3, as will be readily understood by reference to Fig. 5. Now when the car-wheel passes over the spring-plate O and depresses the same to establish a circuit, as above described, then at the same time the bell-crank lever P^4 is actuated by the said plate O moving downward. The movement of the bell-crank lever P^4 causes a pull on the link P^3, which imparts a swinging motion to the lever P^2, and the latter by being connected with the bell-crank lever P causes a raising of the armature soon after the contact has been made, as before described. Thus when the electric circuit is closed the armature-lever L is attracted, but only for an instant, as then the plate O causes the lever P to swing, as before described, to return the armature-lever to its former normal position, in which it is finally held by the spring L^3. Now as soon as the armature is attracted by the closing of the circuit the free end of the said lever travels up the incline I^5 in the bottom of the notch I^4 of the arm I^3 of the lever I, whereby the arm I^3 is free to swing inward as soon as the armature-lever travels into the enlarged part of the notch I^4. As soon as the arm I^3 is thus unlocked an unlocking of the lever I takes place, the latter being forced outward out of engagement by its hook I′ with the wheel J, caused by the pressure of the spring K′ on the washer K, resting on the inner side of the said lever I. As soon as the wheel J is released by the lever I the auxiliary clock mechanism D is unlocked and is now actuated by its spring in the usual manner, so that a rotary motion is imparted to the wheel D^2 by the pinion D^3 on the minute-shaft D^4. The wheel D^2 rotates until the arm H, carried by the said wheel, comes in contact with the spring-arm G′ on the wheel G, and as soon as the said arm strikes the spring-arm G′ the said lever is turned slightly, thus causing a turning of the shaft H′ and an inward movement of the arm H^3, held on the said shaft H′. The inward movement of the arm H^3 causes a pull inward on the rod H^4, and as the latter is connected with the outer surface of the lever I by means of the nut H^5 the said lever is again swung inward to engage with its hook I′ the wheel J, and the latter is thus again locked and further rotation of the auxiliary clock mechanism is prevented. Now it will be seen that the continuously-going clockwork E has advanced the wheel J to a position corresponding to the hour of the day indicated by the sets of hour and minute hands F F′. Now when the auxiliary clockwork mechanism is actuated, as before described, and the wheel D is actuated its hands C and C′ indicate on the dials B and B′, respectively, until the auxiliary clock mechanism D is stopped at the time the lever H strikes the arm G′. When this takes place, the minute and hour hands C and C′ of the auxiliary clock mechanism assume a position corresponding to that of the minute and hour hands F F′, indicating the time of day. Thus it will be seen that when a train passes the plate O and depresses the same, as before described, then the sets of minute and hour hands C are actuated until they come to a stop, indicating the exact time of the day as given by the hands F F′ of the regular clock mechanism E. It will further be seen that the hour and minute hands C C′ remain in this position, as further movement of the auxiliary clock mechanism D ceases, as before described, as soon as the lever H strikes the spring-arm G′. The regular clock mechanism E continues in its movement—that is, the wheel G is rotated so that the arm G′ moves away from the lever H and when a second train passes and actuates the plate O then the auxiliary mechanism is again released, as above described, and causes a rotation of the wheel D^2 until the lever H again strikes the arm G′, and the above-described operation is then repeated. The hour and minute hands C C′ are then moved from their former position again to a position on the dials B B′ corresponding to the position of the sets of hands F F′ on the dials B^2 and B^3.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. In a railway time-signal, the combination, with a time-clock indicating the time of the day, of an auxiliary clock mechanism, an electro-magnetic releasing mechanism for the said auxiliary clock mechanism, and a stop mechanism, substantially as described, controlled from said time-clock and arranged to stop the auxiliary clock mechanism, the said stop mechanism comprising a lever fulcrumed on a wheel of the auxiliary clock mechanism and adapted to abut on an arm on one of the said wheels of the time-clock, a rod connected

with the said lever, and a stop-lever connected with the said rod and adapted to engage a stop-wheel on the wind-wheel shaft of the said auxiliary clock mechanism, substantially as shown and described.

2. In a railway time-signal, a stopping mechanism comprising an arm held on a revoluble gear-wheel, a wheel mounted to turn and carrying a lever adapted to abut on the said arm, a rod connected with the said lever and fitted to slide in the hub of the said second wheel, and a stop-lever connected with the said rod, substantially as shown and described.

3. In a railway time-signal, a stopping mechanism comprising an arm held on a revoluble gear-wheel, a wheel mounted to turn and carrying a lever adapted to abut on the said arm, a rod connected with the said lever and fitted to slide in the hub of the said second wheel, a stop-lever connected with the said rod, and a spring pressing on the said stop-lever, substantially as shown and described.

4. In a railway time-signal, a stopping mechanism comprising an arm held on a revoluble gear-wheel, a wheel mounted to turn and carrying a lever adapted to abut on the said arm, a rod connected with the said lever and fitted to slide in the hub of the said second wheel, a stop-lever connected with the said rod, a spring pressing on the said stop-lever, and an armature-lever controlled by electro-magnets and having its free end extending into a notch in the said stop-lever, substantially as shown and described.

5. In a railway time-signal, the combination, with an electro-magnet, of a releasing device for the armature-lever of the said electro-magnet and comprising a plate adapted to be actuated by the wheels of the passing train, a lever engaging the said armature-lever, and intermediate mechanism for connecting the said second lever to impart a swinging motion to the latter when the said plate is pressed, substantially as shown and described.

WALTER SCOTT.

Witnesses:
W. L. JUDKINS,
R. M. CONNOR.

(No Model.)

W. E. PORTER.
CLOCK REGULATOR.

No. 482,985. Patented Sept. 20, 1892.

Fig 1

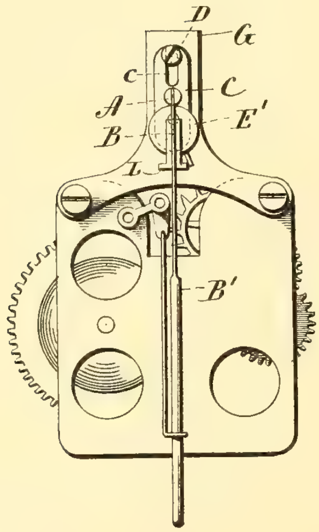


Fig 2

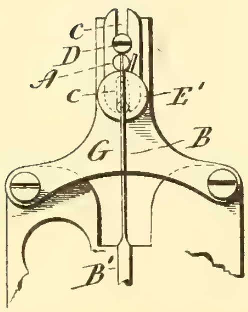


Fig 3

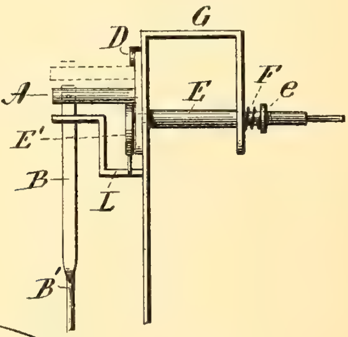
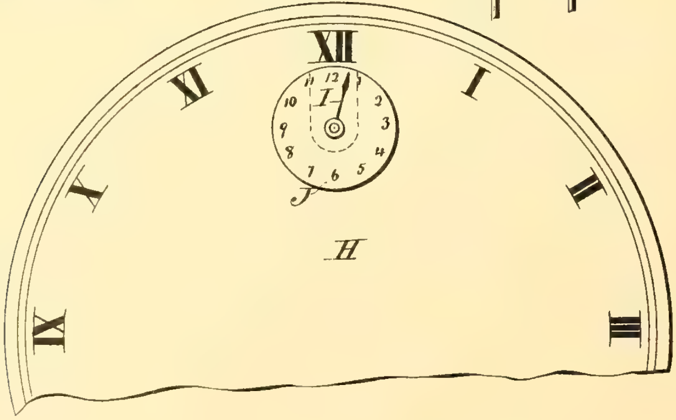


Fig 4



Witnesses.
J. H. Shumway.
Lillian D. Kelsey.

Wilson E. Porter,
Inventor.
By atty
Earle Seymour

UNITED STATES PATENT OFFICE.

WILSON E. PORTER, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE NEW HAVEN CLOCK COMPANY, OF SAME PLACE.

CLOCK-REGULATOR.

SPECIFICATION forming part of Letters Patent No. 482,985, dated September 20, 1892.

Application filed May 23, 1892. Serial No. 434,043. (No model.)

To all whom it may concern:

Be it known that I, WILSON E. PORTER, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Regulators for Clocks; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in rear elevation of a clock-movement provided with a regulating device constructed in accordance with my invention and showing the suspension-stud in its lowest position; Fig. 2, a similar but less comprehensive view showing the suspension-stud in its highest position; Fig. 3, a view of the device in side elevation; Fig. 4, a broken view of a portion of the dial of the clock, showing the forward end of the shaft of the regulating device with the scale provided for gaging the rotation thereof.

My invention relates to an improvement in regulators for clocks, the object being to produce a simple, convenient, reliable, and durable device.

With these ends in view my invention consists in the combination, with a vertically-movable suspension stud, of an eccentric located below the same and having its edge engaged therewith, means for rotating the said eccentric to vary the elevation of the stud, and a tension-spring for resisting the rotation of the eccentric.

My invention further consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As herein shown, a suspension-stud A, which is split to receive the flexible upper end B of the pendulum-rod B′, is secured to a vertically-movable carrier having the form of an oblong plate C, constructed at its upper and lower ends with open slots *c c*, the upper slot receiving a guiding-screw D, while the lower slot receives the projecting rear end of the shaft E, carrying the eccentric E′, which is located below the stud A, which rests upon its edge, so that when the shaft and hence the eccentric are rotated the stud will be raised and lowered, the stud being always held in close contact with the shaft by the weight of the pendulum-rod and ball. A spring F, encircling the forward end of the said shaft E and interposed between a collar *e*, mounted thereon, and the bent arm of the frame G, is provided for resisting the rotation of the shaft, so as to prevent any movement thereof, except as it is turned manually. The extreme forward end of the shaft is by preference projected through the dial H of the clock and provided with a hand I, arranged to sweep over a scale J thereon, whereby the movement of the hand may be accurately gaged to effect the amount of regulation desired. The said frame G is struck up from a single piece of metal and adapted to be attached to the upper edge of the back plate of the clock-movement. It carries all the parts that I have mentioned, which are preferably assembled with it before its attachment to the movement. As herein shown, it is also provided with a fixed crutch L.

It is apparent that in carrying out my invention I might make other provision for the vertical movement and carriage of the suspension-stud and for the mounting of the eccentric-shaft and the restraint thereof from rotation, &c., and I would therefore have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a clock, the combination, with a vertically-movable suspension-stud, of an eccentric located below the same and having its edge engaged therewith, a shaft on which the eccentric is mounted and by which it is turned, and a spring applied to the shaft for resisting its rotation, substantially as set forth.

2. In a clock, the combination, with a suspension-stud, of a vertically-movable carrying-plate in which the stud is mounted, an eccentric located below the stud and having its edge engaged therewith, a shaft having

the eccentric mounted on its forward end, and a tension-spring applied to the shaft, substantially as described.

3. In a clock, the combination, with a frame adapted to be attached to a clock-movement, of a vertically-movable carrier applied to the said frame, a stud attached to the said carrier and adapted to have a pendulum suspended from it, a shaft mounted horizontally in the frame and projecting at its ends through the same, an eccentric mounted on the rear end of the shaft and having its edge engaged with the stud, and a tension-spring applied to the shaft to resist its rotation, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILSON E. PORTER.

Witnesses:
FRED C. EARLE,
LILLIAN D. KELSEY.

(No Model) 5 Sheets—Sheet 1

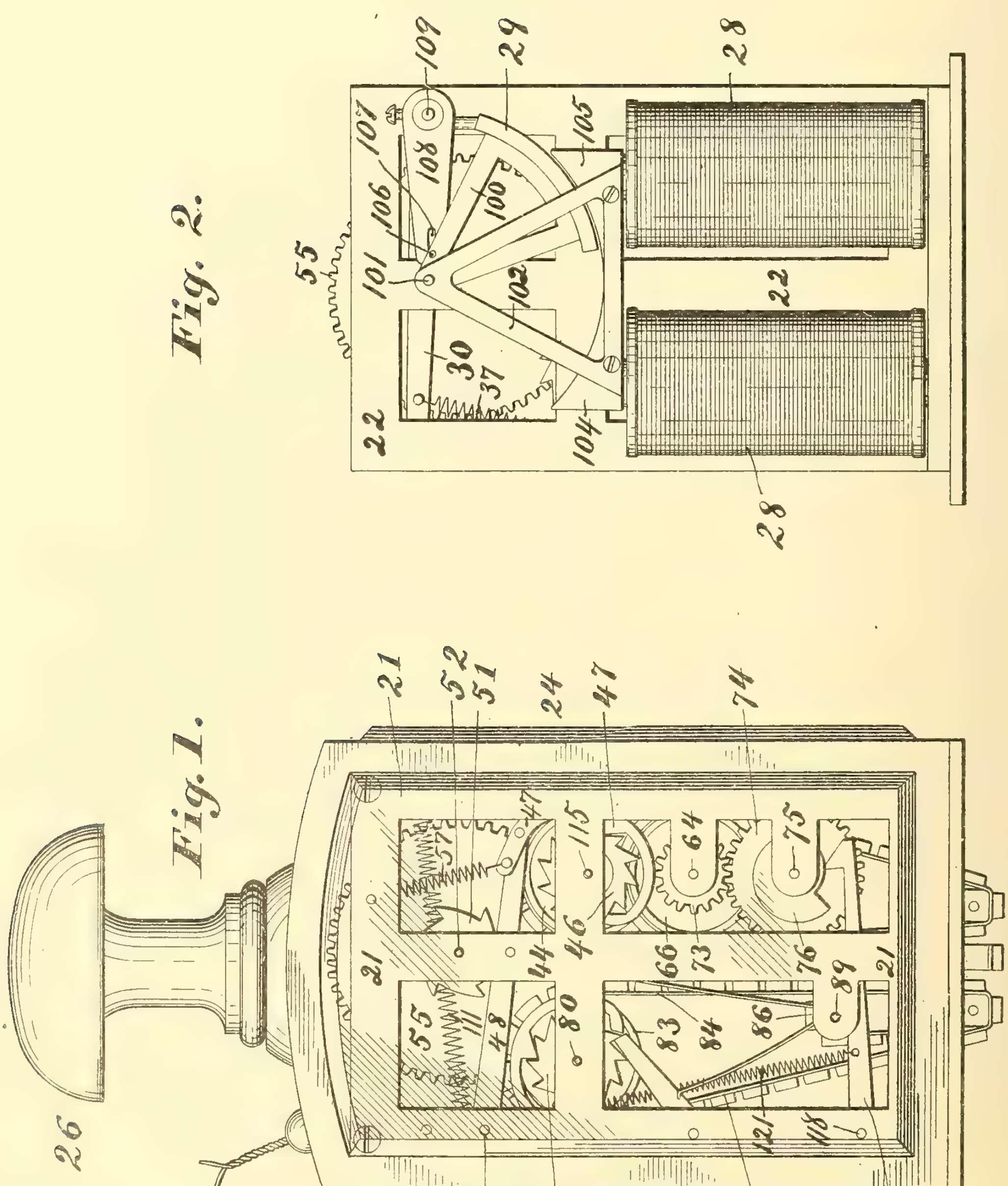
S. H. HOGGSON.

TIME STAMP.

No. 483,151. Patented Sept. 27, 1892.

Fig. 2.

Fig. 1.



Witnesses:

M. M. Brown

John C. Pennie.

Inventor:

S. H. Hoggson,

By Fowler & Fowler

Attorneys.

(No Model.)

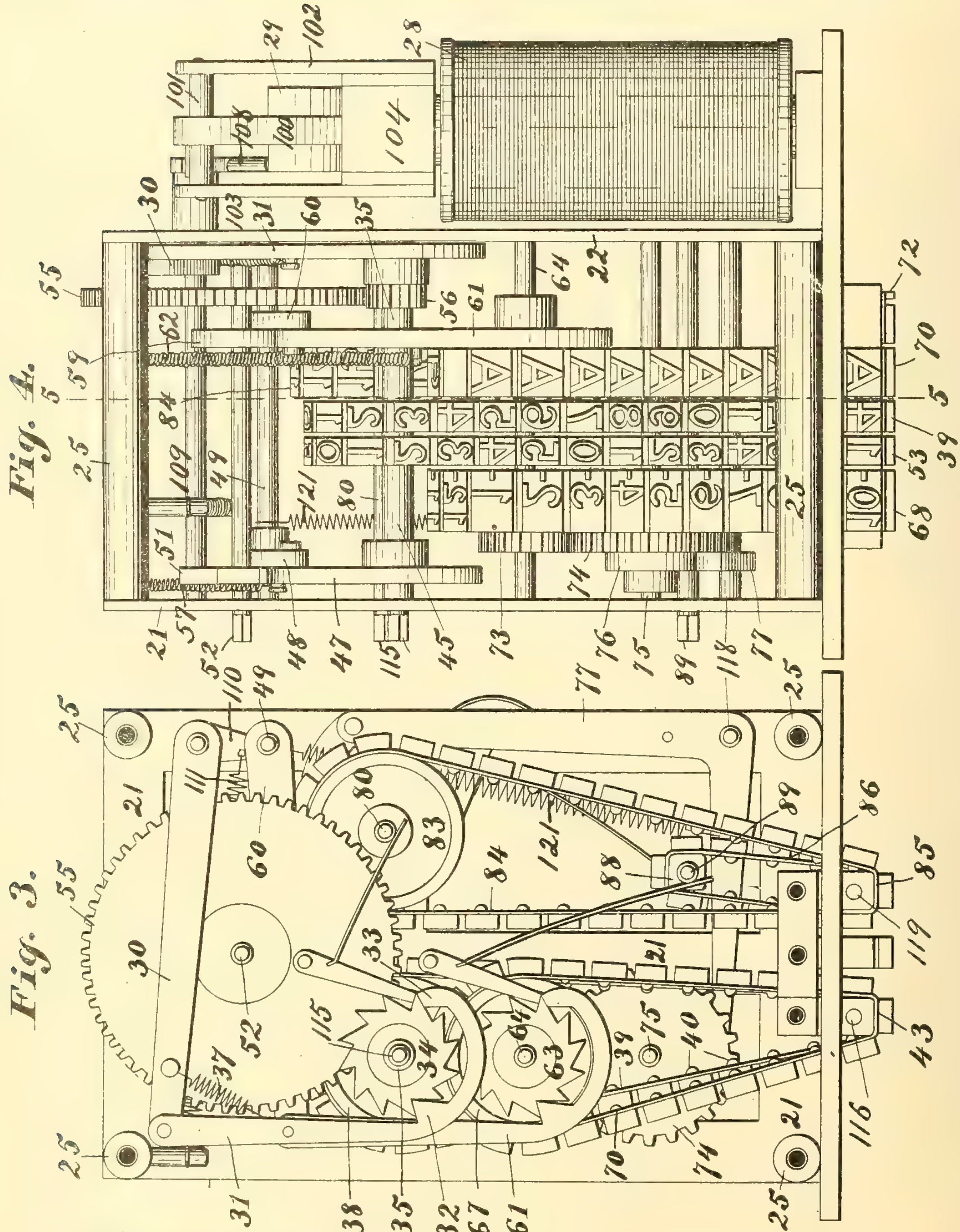
5 Sheets—Sheet 2.

S. H. HOGGSON.

TIME STAMP.

No. 483,151.

Patented Sept. 27, 1892.



Witnesses:

M. M. Brown

John C. Pennie

Inventor:

S. H. Hoggson

By Fowler & Fowler

Attorneys.

(No Model.) 5 Sheets—Sheet 3.

S. H. HOGGSON.

TIME STAMP.

No. 483,151. Patented Sept. 27, 1892.

Fig. 6.

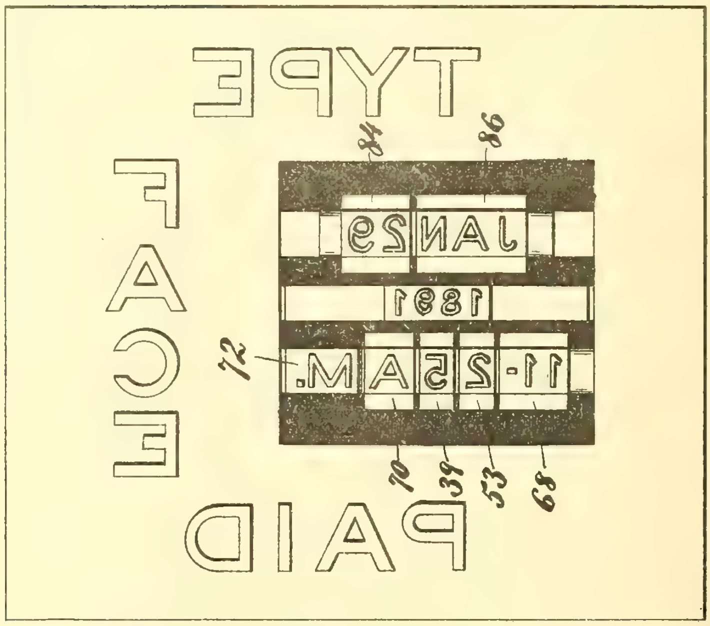
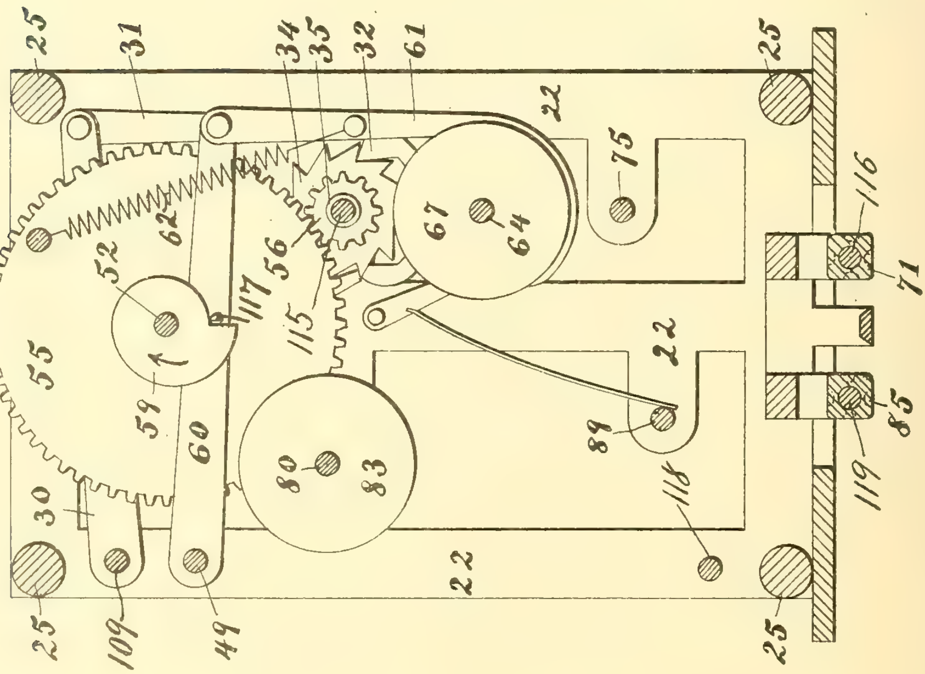


Fig. 5.



Witnesses:

M. M. Brown

John C. Pennie

Inventor:

S. H. Hoggson,

By Fowler & Fowler

Attorneys.

(No Model.) 5 Sheets—Sheet 4.

S. H. HOGGSON.
TIME STAMP.

No. 483,151. Patented Sept. 27, 1892.

Fig. 7.

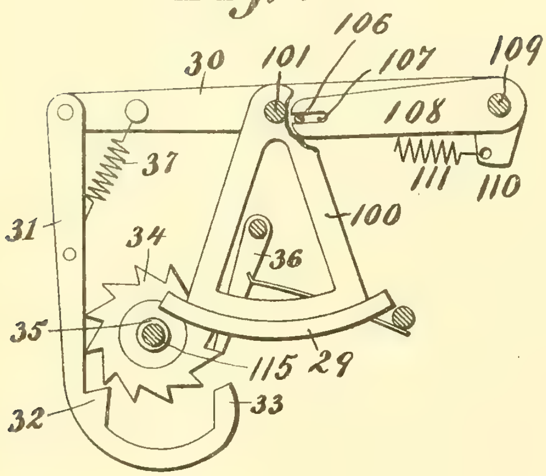


Fig. 8.

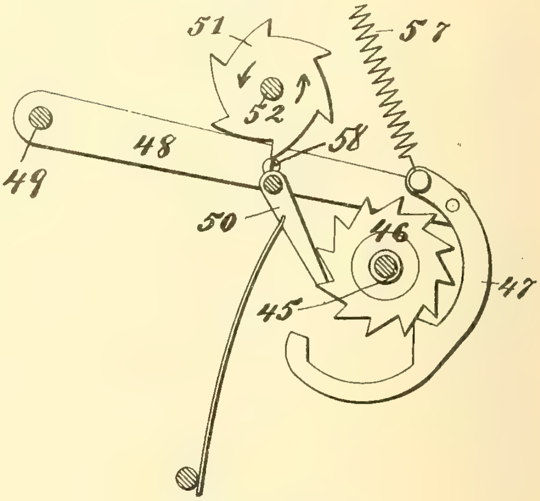


Fig. 9.

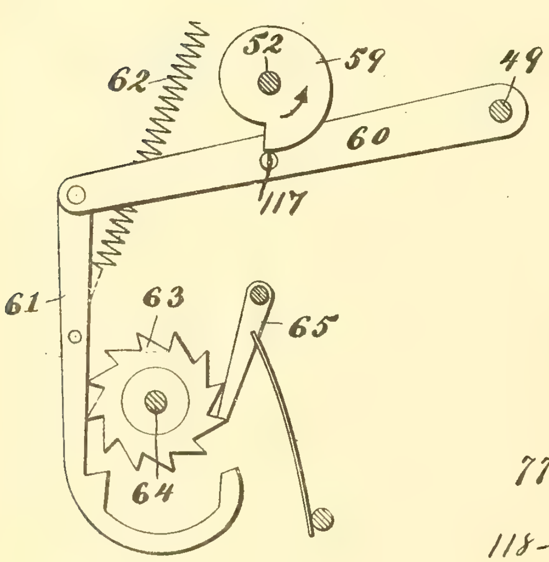


Fig. 10.

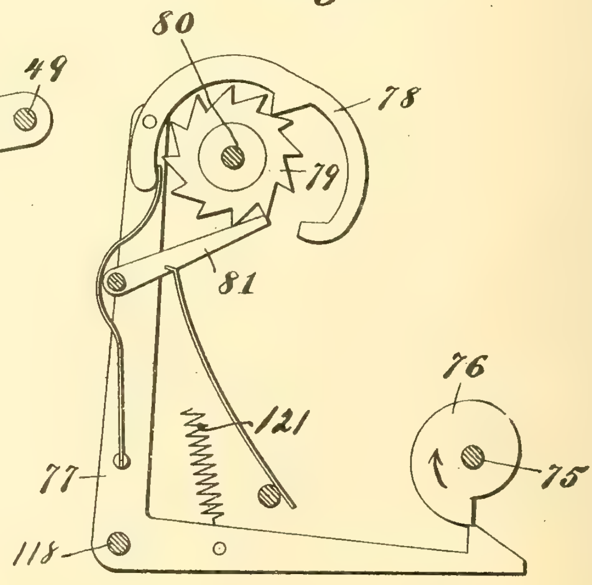


Fig. 11.

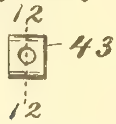


Fig. 12.

Fig. 13.

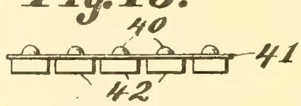
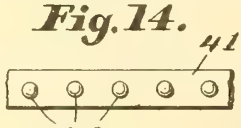


Fig. 14.



Witnesses:

M. M. Brown

John Clennie

Inventor:

S. H. Hoggson

By Fowler & Fowler

Attorneys

(No Model.)

5 Sheets—Sheet 5.

S. H. HOGGSON.

TIME STAMP.

No. 483,151.

Patented Sept. 27, 1892.

Fig. 15.

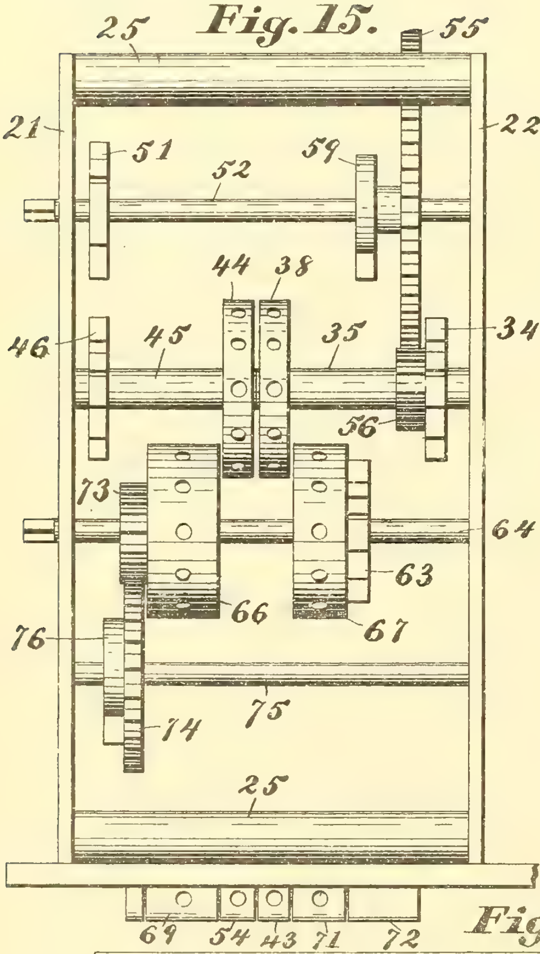


Fig. 16.

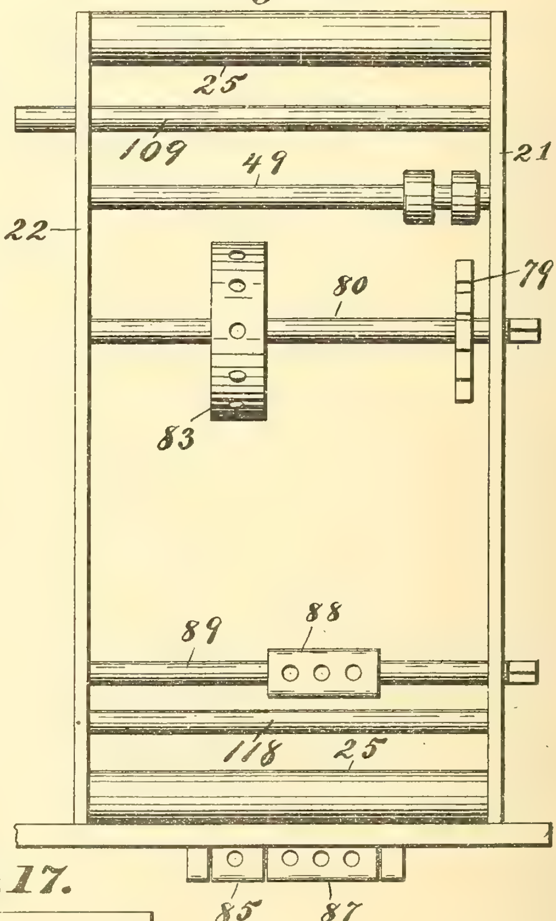


Fig. 17.

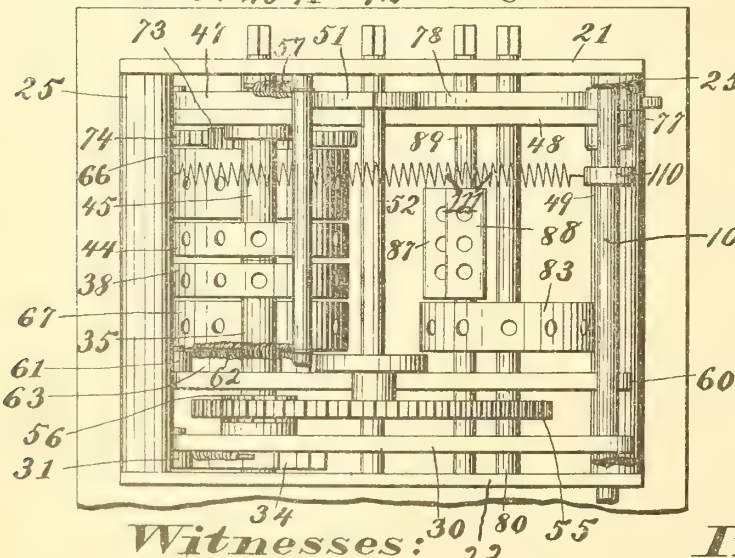


Fig. 18.

Witnesses:

M. M. Brown

John C. Pennie.

Inventor:

S. H. Hoggson,

By Fowler & Fowler

Attorneys.

United States Patent Office.

SAMUEL H. HOGGSON, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE STEVENSON-HOGGSON ELECTRIC COMPANY, OF SAME PLACE.

TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 483,151, dated September 27, 1892.

Application filed February 23, 1892. Serial No. 422,414. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL H. HOGGSON, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a certain new and useful Time-Stamp, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The invention has primarily for its object to make a compact time-stamp in order that the printing of the stamp may be brought within small compass.

The invention has also for its object to cheapen the cost of manufacture of time-stamps and also to make them more reliable in operation.

In time-stamps heretofore constructed metal type-wheels driven by suitable gearing have generally been used to register and print the time. Such type-wheels are expensive to manufacture, and where a multiplicity of them are used, as is necessary in a time-stamp, the stamp must of necessity be made large and cumbersome. In my stamp I obviate the use of such type-wheels and use devices whereby a time-stamp which automatically registers the minutes, hours, and days may be made of small and convenient size and yet not have its usual functions impaired. To carry out this I provide bands in the nature of sprocket-belts, which carry the type and at the same time serve to transmit the power from one wheel to another without the use of other gearing for this purpose. These bands I preferably make in a peculiar manner, which will be hereinafter set forth in detail.

The invention consists in certain features, which will be set forth in detail, and then pointed out in the claims making a part thereof.

The invention will be best understood by referring to the accompanying drawings, delineating my time-stamp on a much-enlarged scale to better illustrate it, in which drawings—

Figure 1 is a front elevation of one form of time-stamp made in accordance with my invention. Fig. 2 is a rear elevation thereof with the handle of the stamp removed. Fig. 3 represents a rear view, the rear frame being removed; Fig. 4, an end elevation looking from the left of Fig. 1 and having the side frame removed; Fig. 5, a vertical section on the line 5 5 of Fig. 4; Fig. 6, a bottom or inverted plan view of the stamp; Figs. 7, 8, 9, 10, 11, 12, 13, and 14, views of details. Fig. 15 is a side view with the magnet, bands, and actuating-levers removed, looking from the left hand of Fig. 3 and the right hand of Figs. 1 and 5 and from in front of Fig. 4. Fig. 16 is a similar view to the latter as seen from the other side. Fig. 17 is a plan with the top plate and bands removed. Fig. 18 is a view illustrating an impression which may be taken from a time-stamp made in accordance with my invention.

The same marks of reference indicate the same parts throughout the different views.

21 is the front frame, 22 the rear frame of the stamp, and 23 and 24, Fig. 1, the side frames. These frames in Fig. 1 are each here represented as provided with a pane of glass in order to clearly show the construction of the interior of the stamp. In practice the frames may be made of a solid piece of metal, if desired. The front frame 21 and the rear frame 22 are secured together by means of four tie-bars 25.

The bottom of the stamp is partly open to accommodate the recording or printing-registering mechanism, and may be provided with type to print any desirable matter in addition to the matter printed by the registering mechanism, as clearly indicated in Fig. [illegible].

The top of the stamp may be suitably closed and provided with a handle [illegible].

The stamp may be mounted in any suitable way. When the stamp is freed from its mounting, as shown, it may be used as an ordinary hand-stamp to make impressions, the type on the bottom thereof being first suitably inked by being pressed upon an inking-pad, for instance, and then impressed upon the surface upon which the printing is to be effected.

Impulse transmitting and receiving apparatus.—The stamp is adapted to register every minute, this preferably being the short-

est interval of time which may be registered by the stamp. The impulses conveyed to the registering mechanism to indicate the minutes may be communicated to said mechanism by any suitable means—such, for instance, as a clock—mechanically transmitting its impulses to the registering mechanism, and the said clock being located adjacent to or in the case of the stamp; or the time impulses may be conveyed to the stamp from a distance—as, for instance, by a master-clock or other device controlling an electrical circuit leading to the stamp, or even by a device transmitting impulses to the stamp by compressed air or other means. I preferably, however, design to have the impulses transmitted to the registering mechanism by means of an electrical circuit, registering the minute impulses upon an electro-magnet in the same case with the time-registering mechanism, and for this purpose I may provide a horseshoe electro-magnet 28 at the rear of the stamp.

One-minute-registering mechanism.—The armature 29 of the magnet 28 is carried by a triangular sector-like piece 100 swung upon a spindle 101, which is carried by triangular frames 102 and 103, supported upon the magnet. The armature 29 forms part of an arc of a circle through which it swings, and the pole-pieces 104 and 105 of the magnet are curved concentrically with the armature. The triangular part 100 is provided with a pin 106, which works in a slot 107 in an arm 108, arranged upon a shaft 109. From this shaft 109 extends a projection 110, to which is attached a spiral spring 111. The spring 111 normally tends to keep the arm 108, the triangular part 100, and the armature 29 raised. (See Figs. 2 and 3.) When an impulse is received through the magnet, the armature 29 is attracted to a central position between the pole-pieces 104 and 105, (see Fig. 7,) depressing the arm 108 and slightly rotating the shaft 109 in opposition to the spring 111. To the shaft 109 is rigidly secured an arm 30, to which is articulated a finger 31, provided with two teeth 32 and 33, which drive a ratchet-wheel 34, carried by a sleeve 35, journaled upon a shaft 115, supported at each end by the front and rear frames. This ratchet-wheel 34 is engaged by a spring-actuated pawl 36, which prevents it from moving in a reverse direction to the rotation imparted to it by the said finger 31. To the finger 31 is attached one end of a spiral spring 37, the other end of which may be fastened to the arm 30. This spring tends to hold the finger 31 in engagement with the ratchet 34 and returns the finger to and maintains it in its normal position.

The normal position of the parts just described is shown in Fig. 3. When the minute impulses of electricity are transmitted through the coils of the electro-magnet 28, the armature 29 is drawn down and the finger 31 is moved to the position shown in Fig. 7, the tooth 32 thereof riding down over the teeth of the ratchet-wheel 34, the spring 37 of the finger permitting such action. As soon as the finger 31 reaches its lowest position the spring 37 draws the tooth 32 well into engagement with the next tooth of the ratchet-wheel 34. At the cessation of the impulse the finger 37 and arm 30 are drawn upward to their normal position through the instrumentality of the shaft 109 and spring 111. The tooth 32 thereby rotates the ratchet-wheel 34 through the distance of one tooth and the inclined face of one of the teeth of the ratchet-wheel comes squarely against the tooth 33, which serves as a stop for the ratchet-wheel and prevents it from by any possibility moving more than through the distance of one tooth at each actuation of the arm 30, as clearly shown in Fig. 3. The ratchet-wheel 34 is therefore positively locked against accidental displacement or overrotation. It will be noted in this connection that the mechanism does not register during the time the impulse is transmitted to the stamp, but that the impulse is stored up each time and registers at the cessation of the impulse. This feature is an important one, for should an impression be taken while an impulse is being transmitted to the stamp such impulse is not lost, as in previously-constructed stamps, but is stored up until the mechanism has an opportunity to register. Were the registering performed when an impulse was transmitted to the mechanism it might transpire that an impression was being taken at the same instant. The type being then against the paper it is impossible for the mechanism to rotate and respond to the impulse, being prevented therefrom by contact with the paper. The impulse is therefore lost and the stamp will become one minute behind time. When this occurs several times during the day, the stamp will be as a consequence several minutes slow in point of time.

Upon a sleeve 35, carried by the shaft 115 and at one side of the center of the stamp, is a wheel 38, over which passes a band 39. This wheel is substantially as shown in Fig. 15, and has indentations in it into which projections or teeth 40 on the back of the band take. The band is made substantially as shown in Figs. 13 and 14, it having a central portion 41 of suitable flexible material, preferably very thin linen or canvas, upon the back of which are the teeth or projections 40, as described, and upon the face thereof are carried rubber type 42, one of the projections 40 being placed at the rear and center of the type. The portion of the band between the type is therefore left flexible. I do not claim herein the band itself nor the manner of making the same, as I obtained on the 9th day of June, 1891, Letters Patent of the United States No. 453,699 for this. The said band passes over a small wheel 43, arranged upon a shaft 116 at the bottom of the stamp, which wheel has indentations in it similar to the wheel 38 to receive the projections 40 on the back of the band.

The wheel 43 is made substantially as shown in Figs. 11 and 12, being preferably quadrangular in cross-section. The teeth or projections 40 of the band, taking into the indentations in the wheels 38 and 43, prevent the band from slipping sidewise from the wheels and transmit the motion imparted to said wheel 38 by the mechanism described to the wheel 43, at the same time bringing the characters in position for printing. The band 39 prints the units of the minutes and has upon it the digits repeated in three series.

Ten-minute-registering mechanism.—Adjacent to the wheel 38 is another wheel 44, arranged upon a sleeve 45, mounted loosely upon the shaft 115, before alluded to, and which is independent of the sleeve 35, carrying the wheel 38. This sleeve 45 carries a ratchet-wheel 46, which is controlled by a finger 47, (similar to the finger 31, before described,) that is articulated to a lever or arm 48, carried by a shaft 49, journaled at each end by the side frames 21 and 22 of the stamp. The ratchet-wheel 46 is provided with a spring-actuated pawl 50 for permitting it to rotate in one direction, but holding it from rotating in another direction in a similar manner to the ratchet-wheel 34, before referred to. The lever or arm 48, controlling the finger 47 and escapement-wheel 46, is governed by a cam 51, having six inclined or cam-surfaces. This cam is arranged upon a shaft 52, which is journaled at each end in the side frames 21 and 22 of the stamp. On the wheel 44 is placed a ten-minute band 53, which passes over a small wheel 54 on the shaft 116 at the bottom of the stamp similar and adjacent to the quadrangular wheel 43, before referred to, and arranged upon the same shaft therewith. The band 53 has on it the digits from "0" to "5", inclusive, repeated five times. The cam 51 and the parts controlled thereby, including the band 53, are operated every ten minutes. This is accomplished by the following mechanisms: Upon the shaft 52, carrying the cam 51, is a spur-wheel 55, Figs. 5 and 15, which meshes into a pinion-wheel 56, carried by the sleeve 35, before referred to, which latter sleeve is actuated every minute, as previously described, by the impulses sent through the coils of the magnet 28. The pinion-wheel 56 and the spur-wheel 55 are so proportioned that the spur-wheel 55 turns once every hour or makes one complete rotation for every sixty actuations of the ratchet-wheel 34. As the cam 51 is carried by the same shaft upon which the spur-wheel 55 is arranged, it will be seen that the lever 48 is actuated six times every hour by the six projections on the cam 51. The finger 47, carried by the lever 48, is provided with a spring 57, which normally holds the finger in engagement with the escapement-wheel 46, and also serves to maintain the lever 48 and the finger 47 in and return them to their raised position. The cam 51 is rotated by the mechanism just described in the direction of the arrows, Fig. 8, and when the teeth of the cam 51 escape the projecting part 58 of the lever 48 the spring 57 returns the finger and lever 48 to their raised position and actuates the ratchet-wheel 46. It will be noted that the escapement-wheel 46 is actuated on the return movement of the parts, and although the lever 48 is partly depressed each time the cam 51 is actuated, it does not return to its highest position until the cam-surfaces escape the projecting part 58 upon said lever.

As before explained, the band 39, which registers the units of the minutes, has upon it numbers from "0" to "9," repeated in three series. After "9" has been registered by the band 39 and the said band is actuated the projection 58 on the lever 48 escapes one of the cam-surfaces of the cam 51 and carries one to the ten-minute band, a "0" being brought into position upon the one-minute band. From this it will be evident that the one-minute band 39 registers the minutes from "0" to "9," or the units thereof, and that the ten-minute band 53 registers the numbers from "0" to "5," or the tens of the minutes.

Hour-registering mechanism.—Upon the shaft 52, which carries the cam 51 and the spur-wheel 55 and adjacent to the latter, is a single cam 59, which I denominate the "hour-cam." This cam, as will be evident from the previously-described mechanism, completes a revolution once in every hour. It is arranged to operate upon a pin 117 on a lever 60, swung upon the shaft 49, before described. To this lever 60 is articulated a finger 61, similar to the fingers 47 and 33, before described. The said finger 61 is provided with a spring 62 for holding it in engagement with a ratchet-wheel 63, carried by a shaft 64, journaled at each end in the side frame of the stamp. The spring 62, in addition to performing the function set forth, is adapted to return the lever 60 and finger 61 to their normal position after the pin 117 of the lever 60 escapes the cam 59. A spring-actuated pawl 65 is provided for the ratchet-wheel 63 to hold it in position.

Upon the shaft 64 are arranged two wheels 66 and 67, over the former of which passes a band 68 of the kind set forth, bearing numbers from "1" to "12," indicating the hours, and preferably repeated twice upon the same. This band passes over a small wheel 69 at the bottom of the stamp adjacent to the ten-minute band, and is arranged upon the same shaft 116 as the small quadrangular wheels 43 and 54, referred to above.

Meridian-registering mechanism.—Over the wheel 67, which is of the same diameter as the wheel 66, passes a band 70, adjacent to the one-minute band, and traveling over a small quadrangular wheel 71 at the bottom of the stamp similar to the wheel 43 and arranged next to the small quadrangular wheel 43. This band 70 has the letters "A" and "P" arranged upon it, the letter "A" being repeated twelve times in succession, corresponding to the num-

bers from "1" to "12" upon the band 68, and the letter "P" repeated thereon eleven times in succession and one blank space left between the "A's" and "P's" on said band. (See Fig. 4.) The letter "M" is arranged at the bottom of the stamp at 72, adjacent to the band 70, and is permanently fixed in its place. This letter, in connection with the traveling band 70, gives the "A. M." and "P. M." The blank space on the band I arrange to come opposite the "M" at twelve o'clock noon in order to clearly and unmistakably distinguish the time registered by the stamp from twelve to one at noon from the hour between twelve and one at midnight. The time printed by the stamp between twelve and one at noon will therefore be designated by the letter "M" only and the time between the same hours at midnight by "A. M." I employ this system because were the twelve at noon designated by "P. M." and the twelve at night as "A. M.," or vice versa, it would cause confusion in the mind and render it doubtful as to whether such registration referred to noon or midnight. As it is, the time registered by the stamp exactly at twelve midnight will be wrong for one instant, as the stamp will print "12 A. M." at midnight, whereas it really is "12 P. M." at this instant. This slight discrepancy will be obviated, however, as soon as the next minute is registered. These slight discrepancies could be, of course, obviated by additional mechanism; but it would unnecessarily complicate the mechanism. It is to be noted from the construction set forth that the band 68 bearing the numbers indicating the hours moves at the same time that the band 70 bearing the "A's" and "P's." It is of course within the spirit of my invention to arrange the mechanism to print the "A. M." and "P. M." differently; but I prefer the arrangement herein shown, as it accomplishes the result with few parts and in a thoroughly reliable manner.

Day-registering mechanism.—Upon the shaft 64, adjacent to the wheel 66, is a pinion-wheel 73, which meshes into a spur-wheel 74, Figs. 1 and 15, carried by a shaft 75, journaled in the front and rear frames of the stamp at each end. This shaft 75 has upon it a cam 76, which actuates a bell-crank lever 77, Figs. 1 and 10, swung upon a shaft 118 and carrying at its upper end a finger 78, that is articulated to it. The said finger 78 is similar to the fingers previously described and actuates a ratchet-wheel 79, Figs. 10 and 16, upon a shaft 80, supported at each end by the front and rear frames. The bell-crank lever 77 is governed by a spiral spring 121 in the same manner as the previously-described spring actuated arms or levers. The ratchet-wheel 79 has a spring-actuated pawl 81 to hold it in whatever position it is moved. The shaft 80 has rigidly secured to it a wheel 83, over which passes a band 84, bearing numbers from one "1" to thirty-one "31," inclusive, indicating the days of the month. This band passes over a small wheel 85, arranged upon a shaft 119, parallel with and a short distance from the shaft 118, referred to in the foregoing. The pinion-wheel 73, carried by the shaft 64, moves through one tooth each hour, and the teeth of the pinion 73 and the spur-wheel 74 are so numbered that the said spur-wheel 74 and its shaft 75 completes a rotation once in each day, and the spur-wheel 74 being made twice the diameter of the pinion-wheel 73. This being the case the cam 76 actuates the bell-crank lever 77 once in twenty-four hours and thereby operates the finger 78 once each day. Hence the ratchet-wheel 79 is moved through one tooth every twenty-four hours and the shaft 80, carrying the day-wheel 83, is actuated once a day. This positions the characters upon the band 84, so as to print the days of the month.

Month-indicating mechanism.—Adjacent to the wheel 85 and the band 84, designating the days of the month, is a band 86, which passes over a small wheel 87 at the bottom of the stamp arranged upon the same shaft 119 as the wheel 85 and adjacent thereto. This band 86 also passes over a small wheel 88, Figs. 3 and 16, upon a shaft 89, journaled in the side frame of the stamp and which may be extended through one of the sides of the frame, so as to be manually operated. The band 86 has characters upon it indicating the twelve months of the year. This band I design to have actuated by hand instead of by automatic means, inasmuch as it only has to be set once a month, and for the further reason that some months having more days than others it is advisable that the stamp be adjusted by hand in order to avoid complication of mechanism. Automatic mechanism could of course be devised to compensate for the difference in the length of the months and to operate the month-band; but such mechanism would add unnecessarily to the mechanism of the stamp.

Year-indicating mechanism.—Between the several bands indicating the minutes, hours, days, and months I arrange permanently the numbers designating the year, Figs. 6 and 18. This number or any of the digits thereof may be arranged so as to be removable, whereby the number representing the year can be changed at the end of each year. It is possible of course to provide mechanism which will automatically change the number indicating the years; but as such mechanism would only be called into requisition once a year such adjustment can be made by hand without much trouble.

Other printing characters.—On the bottom of the stamp, as clearly indicated in Fig. 6, may be placed more or less permanently other characters by changeable dies to print any matter desired, such as the word "paid," &c. (See Fig. 18.)

Advantages of bands for printing and transmitting motion.—By using bands to transmit the motion from one wheel to another and

having at the same time the bands carry the characters to be printed I am enabled to bring the parts of the stamp together in a very small compass and to produce a stamp that is less complicated and bulky than previously-constructed time-stamps. By also placing the time-wheels upon different shafts controlled by suitable mechanism I am enabled to bring the time-wheels much nearer together in an axial direction and to make the stamp more compact still, bringing the printing thereof within yet smaller compass. Were the type-wheels used to print the characters the printed matter could not possibly be gotten in as small a compass as shown herein. In order to carry a sufficient number of characters a type-wheel must of necessity be of considerable diameter, and if the type-wheel be made of large dimensions it is impossible to group them closely enough together to print in a small compass.

The flexibility of bands allows the printing to be brought as closely together as desired, which need not be as far apart as the distance between the printing herein indicated, but can be gotten in even smaller compass. Characters on bands also print more clearly, and insertion of other dies and substitution of other characters are easier than with wheels. The importance of printing in small area is obvious when it is remembered that unless the printing of a stamp be gotten into small compass the stamp is useless for performing certain services—as, for instance, stamping upon the coupons of railway-tickets, postmarking letters, and many other like purposes.

Having now fully set forth my invention, what I desire to claim and secure by Letters Patent of the United States is—

1. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, printing characters controlled by said minute-wheel, repeated in three series from "0" to "9," inclusive, a ten-minute wheel arranged adjacent to the one-minute wheel, connections intermediate the impulse-receiving device and the ten-minute wheel for actuating said ten-minute wheel once in every ten minutes, and printing characters governed by the ten-minute wheel and repeated in five series from "0" to "5."

2. A time-stamp having an impulse-receiving device, a one-minute mechanism operated thereby to register the minutes, a cam having six inclines gearing intermediate of said cam and the one-minute mechanism, an escapement controlled by said cam, and a ten-minute wheel governed by said escapement.

3. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, printing characters controlled by said minute-wheel, repeated in three series from "0" to "9," inclusive, a ten-minute wheel arranged adjacent to the one-minute wheel, connections intermediate the impulse-receiving device and the ten-minute wheel for actuating said ten-minute wheel once every ten minutes, and printing characters governed by the ten-minute wheel, repeated in five series from "0" to "5," and an hour-wheel actuated by mechanism intermediate the same and the impulse-receiving device, and controlling printing characters from "1" to "12" repeated in two series and operated once each hour.

4. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, printing characters controlled by said minute-wheel, repeated in three series from "0" to "9," inclusive, a ten-minute wheel arranged adjacent to the one-minute wheel, connections intermediate the impulse-receiving device and the ten-minute wheel for actuating said ten-minute wheel once every ten minutes, and printing characters governed by the ten-minute wheel, repeated in five series from "0" to "5," an hour-wheel actuated by mechanism intermediate the same and the impulse-receiving device, controlling printing characters from "1" to "12" repeated in two series and operated once each hour, and a meridian-wheel moving with the hour-wheel and controlling the printing characters "A" and "P," the former repeated twelve times and the latter eleven times, with a blank space between the two, with the character "M" fixedly arranged adjacent to the said meridian-wheel and adapted, together with the "A's" and "P's" of the meridian-wheel, to print "A. M." and "P. M."

5. A recording-stamp comprising a series of traveling recording flexible bands located side by side and means for actuating said bands one from another, said means being arranged about the assembled bands so as not to interfere with the proximity of the one band to the other, substantially as described.

6. A time-stamp comprising minute and hour recording flexible bands located side by side and impulse receiving and storing mechanism for actuating said bands one from the other, said impulse receiving and storing mechanism being arranged about the series of bands so as not to interfere with the proximity of the one band to the other, substantially as described.

7. A time-stamp comprising two minute-recording flexible digit-bands and an hour-recording flexible band located side by side, and impulse receiving and storing mechanism for actuating one of the digit-bands from the other and the hour-recording band from the second digit-band, said impulse receiving and storing mechanism being arranged about the series of bands so as not to interfere with the proximity of the one band to the other, substantially as described.

8. A time-stamp comprising an impulse receiving and storing mechanism automatically and intermittently operated, a minute-wheel carried by a shaft controlled thereby, a flexible band passing over said minute-wheel and positively geared to the same and a small

wheel at the bottom of the stamp, the said band carrying numbers to represent the minutes, an hour-wheel upon an independent or second shaft, controlled by gearing intermediate the impulse receiving and storing mechanism, and a second flexible band passing over said hour-wheel and positively geared thereto and a small wheel at the bottom of the stamp, the said second band carrying printing characters to represent the hours, the axes of said wheels and shafts being arranged substantially parallel, whereby the printing of the minutes and hours may be gotten within small compass and the time registered by the stamp will not be interfered with by printing.

9. A time-stamp comprising an impulse receiving and storing mechanism intermittently and automatically operated, a minute-wheel carried by a shaft controlled thereby, a flexible band passing over said minute-wheel and positively geared thereto and a small wheel at the bottom of the stamp, the said band carrying numbers to represent the minutes, an hour-wheel upon a second or independent shaft, controlled by gearing actuated by the impulse receiving and storing mechanism, a second flexible band passing over said hour-wheel and positively geared to the same and a small wheel at the bottom of the stamp, the said second band carrying printing characters to represent the hours, a meridian-wheel rigidly fixed upon the last-mentioned shaft, and a third flexible band passing over said meridian-wheel and positively geared to the same, and a third small wheel at the bottom of the stamp and carrying suitable printing characters, the axes of said wheels and shafts being arranged substantially parallel, whereby the minutes, hours, and meridian characters may be printed within small compass and the time registered by the stamp will not be interfered with by printing.

10. A time-stamp comprising an impulse receiving and storing mechanism, an hour-wheel carried by a shaft operated thereby, a flexible band passing over said wheel and positively geared to the same and a small wheel at the bottom of the stamp, the said band carrying printing characters to represent the hours, a day-wheel upon a second or independent shaft, controlled by the impulse receiving and storing mechanism, and a second flexible band passing over said day-wheel and positively geared to the same and a second small wheel at the bottom of the stamp, the said second band having printing characters thereon to represent the days, the axes of said wheels and shafts being arranged substantially parallel, whereby the hours and days may be printed within small compass and the time registered by the stamp will not be interfered with by printing.

11. A time-stamp comprising an impulse receiving and storing mechanism intermittently and automatically actuated, an hour-wheel controlled by a shaft operated thereby, a flexible band passing over said hour-wheel and positively geared to the same and a small wheel at the bottom of the stamp, the said band carrying printing characters to represent the hours, a meridian-wheel upon said shaft, controlled by the impulse receiving and storing mechanism, a second flexible band positively geared to said meridian-wheel and a second small wheel at the bottom of the stamp, the said second band carrying suitable printing characters, a day-wheel also upon a second or independent shaft, controlled by the impulse receiving and storing mechanism, and a third flexible band passing over said day-wheel and positively geared to the same and a small wheel at the bottom of the stamp, the said third band having printing characters to represent the days, the axes of all of said wheels being arranged substantially parallel, whereby the hours, meridian characters, and days automatically registered by the stamp may be printed within small compass and the time registered by the stamp will not be interfered with by printing.

12. A time-stamp comprising an impulse receiving and storing mechanism, a minute-wheel controlled by a shaft operated thereby, a flexible band carrying printing characters to represent the minutes positively geared to said minute-wheel and a small wheel upon a shaft at the bottom of the stamp, an hour-wheel upon an independent or second shaft, governed by the impulse receiving and storing mechanism, a second flexible band positively geared to said hour-wheel and a small wheel on the aforesaid shaft at the bottom of the stamp, the said second flexible band carrying printing characters to represent the hours, a meridian-wheel upon the hour-wheel shaft, also governed by the impulse receiving and storing mechanism, a third flexible band positively geared to the same and a third small wheel on the said shaft at the bottom of the stamp, the said third flexible band carrying suitable meridian printing characters, a day-wheel upon a third shaft, controlled by the impulse receiving and storing mechanism, a fourth flexible band positively geared to said day-wheel, and a fourth small wheel upon a second shaft at the bottom of the stamp parallel and adjacent to the aforementioned shaft at the bottom of the stamp, the said fourth band having printing characters to represent the days, the axes of all of said wheels being arranged substantially parallel, whereby the minutes, hours, meridian characters, and days automatically registered by the stamp may be printed within small compass and the time registered by the stamp will not be interfered with by printing.

13. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged ad-

jacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, and a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels.

14. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel governed by the impulse-receiving mechanism, and a band upon the hour-wheel, having numbers thereon from "1" to "12" repeated in two series and passing over a third small wheel at the bottom of the stamp adjacent to the small ten-minute wheel at the bottom of the stamp.

15. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereupon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel, an escapement therefor, a cam controlling said escapement and actuated by the aforesaid mechanism between the one-minute and the ten-minute wheels, and a band upon the hour-wheel having numbers thereon from "1" to "12" repeated in two series and passing over a third small wheel at the bottom of the stamp.

16. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel controlled by the impulse-receiving mechanism, a band upon the hour-wheel, having numbers thereon from "1" to "12" repeated in two series and passing over a third wheel at the bottom of the stamp adjacent to the small ten-minute wheel at the bottom of the stamp, a meridian-wheel also controlled by the impulse-receiving mechanism and carrying a band with the characters "A" and "P" thereupon, the former repeated twelve times and the latter eleven times with a blank space between the two and corresponding with the numbers upon the hour-wheel, a fourth small wheel at the bottom of the stamp over which said latter band travels and adjacent to the one-minute band, and the character "M," permanently affixed to and arranged adjacent to the meridian-band at the bottom of the stamp.

17. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel, an escapement therefor, a cam controlling said escapement and actuated by the aforesaid mechanism between the one-minute and the ten-minute wheels, a band upon the hour-wheel, having numbers thereon from "1" to "12" repeated in two series and passing over a third wheel at the bottom of the stamp adjacent to the small ten-minute wheel at the bottom of the stamp, a meridian-wheel controlled by the same escapement which governs the hour-wheel and carrying a band with the characters "A" and "P" thereupon, the former repeated twelve times and the latter eleven times, with a blank space between the two and corresponding with the numbers upon the hour-hand, a fourth small wheel at the bottom of the stamp over which said latter band travels and adjacent to the one-minute

band, and the character "M," permanently affixed to and arranged adjacent to the meridian-band at the bottom of the stamp.

18. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereupon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel controlled by the impulse-receiving mechanism, a band upon the hour-wheel, having numbers thereon from "1" to "12" repeated in two series and passing over a third small wheel at the bottom of the stamp adjacent to the small ten-minute wheel at the bottom of the stamp, a meridian-wheel, also controlled by the impulse-receiving mechanism and carrying a band with the characters "A" and "P" thereupon, the former repeated twelve times and the latter eleven times, with a blank space between the two and corresponding with the numbers upon the hour-band, a fourth small wheel at the bottom of the stamp, over which said latter band travels and adjacent to the one-minute band, the character "M," permanently affixed to and arranged adjacent to the meridian-band at the bottom of the stamp, a day-wheel governed by the impulse-receiving mechanism, and a band passing over said day-wheel, having numbers thereon from "1" to "31" and traveling over a small wheel at the bottom of the stamp arranged parallel with and contiguous to the aforesaid small wheel at the bottom of the stamp.

19. A time-stamp comprising an impulse-receiving mechanism, a one-minute wheel operated thereby, a band traveling over said one-minute wheel and having the digits thereon repeated in three series, a small wheel at the lower end of the stamp over which said band passes, a ten-minute wheel arranged adjacent to the aforesaid one-minute wheel, mechanism intermediate the said ten-minute wheel and the said one-minute wheel for actuating the said ten-minute wheel once in every ten minutes, a band traveling over said ten-minute wheel, having the numbers from "0" to "5" repeated thereon in five series, a small wheel at the lower end of the stamp adjacent to the previously-mentioned small wheel, over which second-mentioned small wheel the said latter band travels, an hour-wheel, an escapement therefor, a cam controlling said escapement and actuated by the aforesaid mechanism between the one-minute and the ten-minute wheels, a band upon the hour-wheel, having numbers thereon from "1" to "12" repeated in two series and passing over a third small wheel at the bottom of the stamp adjacent to the small ten-minute wheel at the bottom of the stamp, a meridian-wheel controlled by the same escapement which governs the hour-wheel and carrying a band with the characters "A" and "P" thereupon, the former repeated twelve times and the latter eleven times, with a blank space between the two and corresponding with the numbers upon the hour-band, a fourth small wheel at the bottom of the stamp over which said latter band travels and adjacent to the one-minute band, the character "M," permanently affixed to and arranged adjacent to the meridian-band at the bottom of the stamp, a day-wheel, an escapement governing the same, mechanism intermediate the day-wheel and said latter escapement for controlling said day-wheel, and a band passing over said day-wheel, having numbers thereon from "1" to "31" and traveling over a small wheel at the bottom of the stamp arranged parallel with and contiguous to the aforesaid small wheel at the bottom of the stamp.

In testimony whereof I have hereunto set my hand and affixed my seal this 19th day of February, 1892, in the presence of the two subscribing witnesses.

SAMUEL H. HOGGSON. [L. S.]

Witnesses:

A. C. FOWLER,

JNO. F. GREEN.

(No Model.) 5 Sheets—Sheet 1.

A. L. JAYNES.

WORKMAN'S TIME RECORDER.

No. 483,629. Patented Oct. 4, 1892.

Fig. 1.

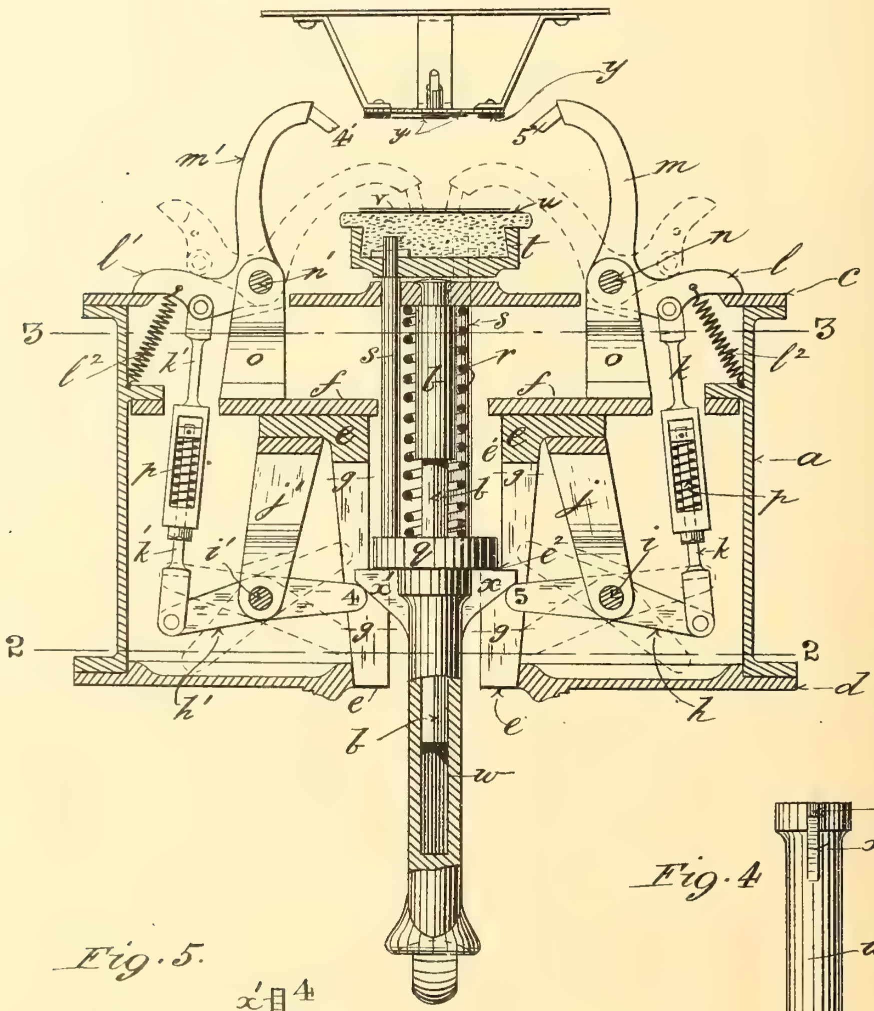


Fig. 4

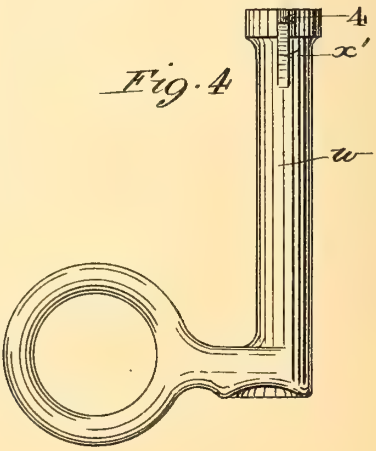
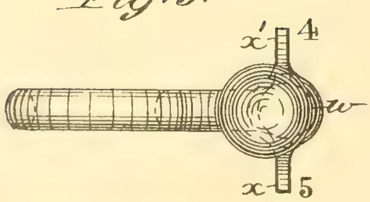


Fig. 5.



WITNESSES

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H. E. Klebper

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.)

5 Sheets—Sheet 2.

A. L. JAYNES.

WORKMAN'S TIME RECORDER.

No. 483,629. Patented Oct. 4, 1892.

Fig. 2.

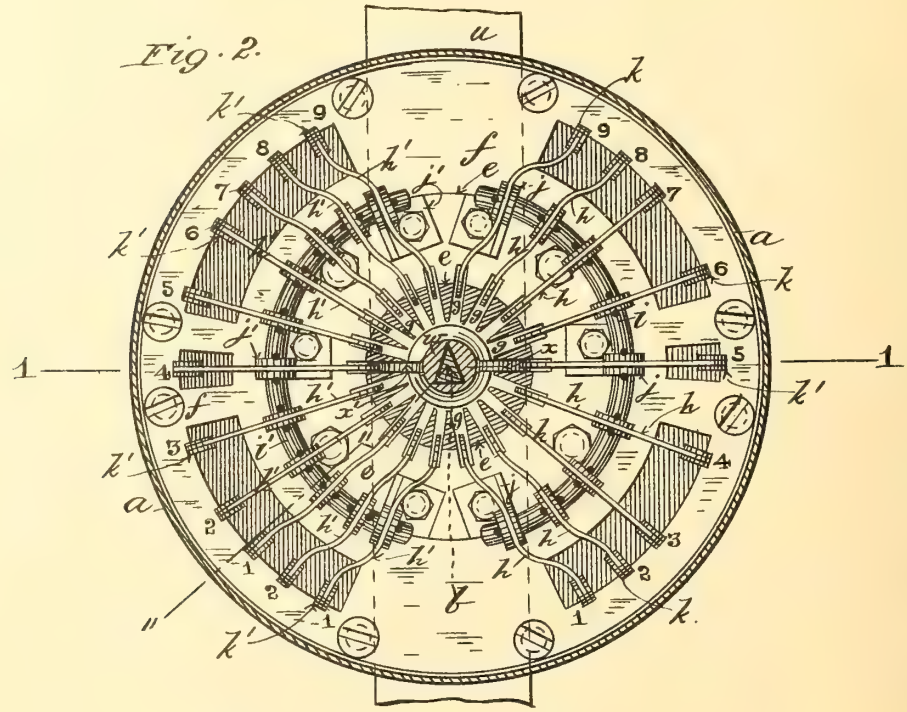
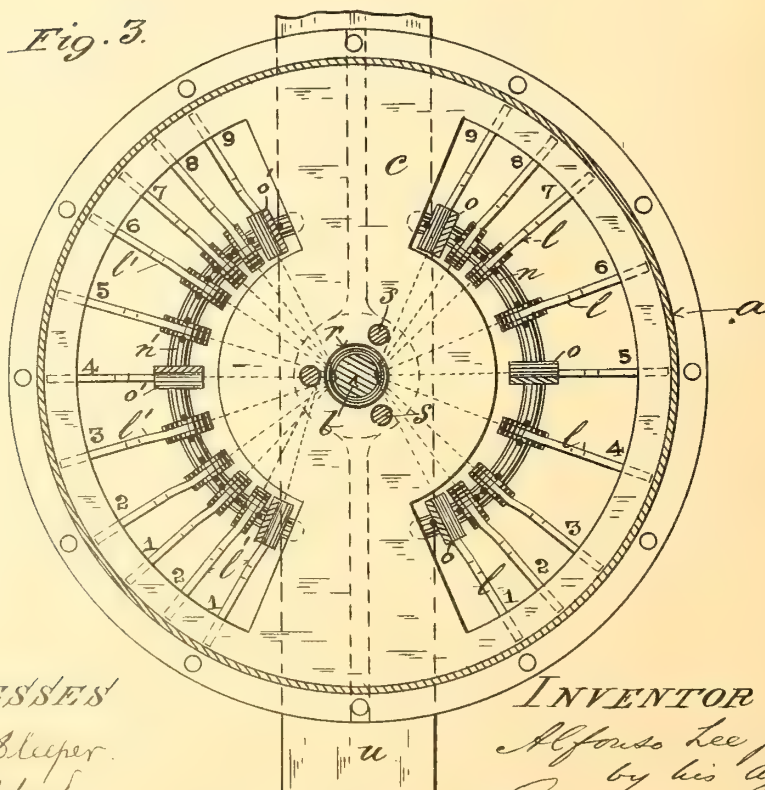


Fig. 3.



WITNESSES

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(No Model.)

5 Sheets—Sheet 3.

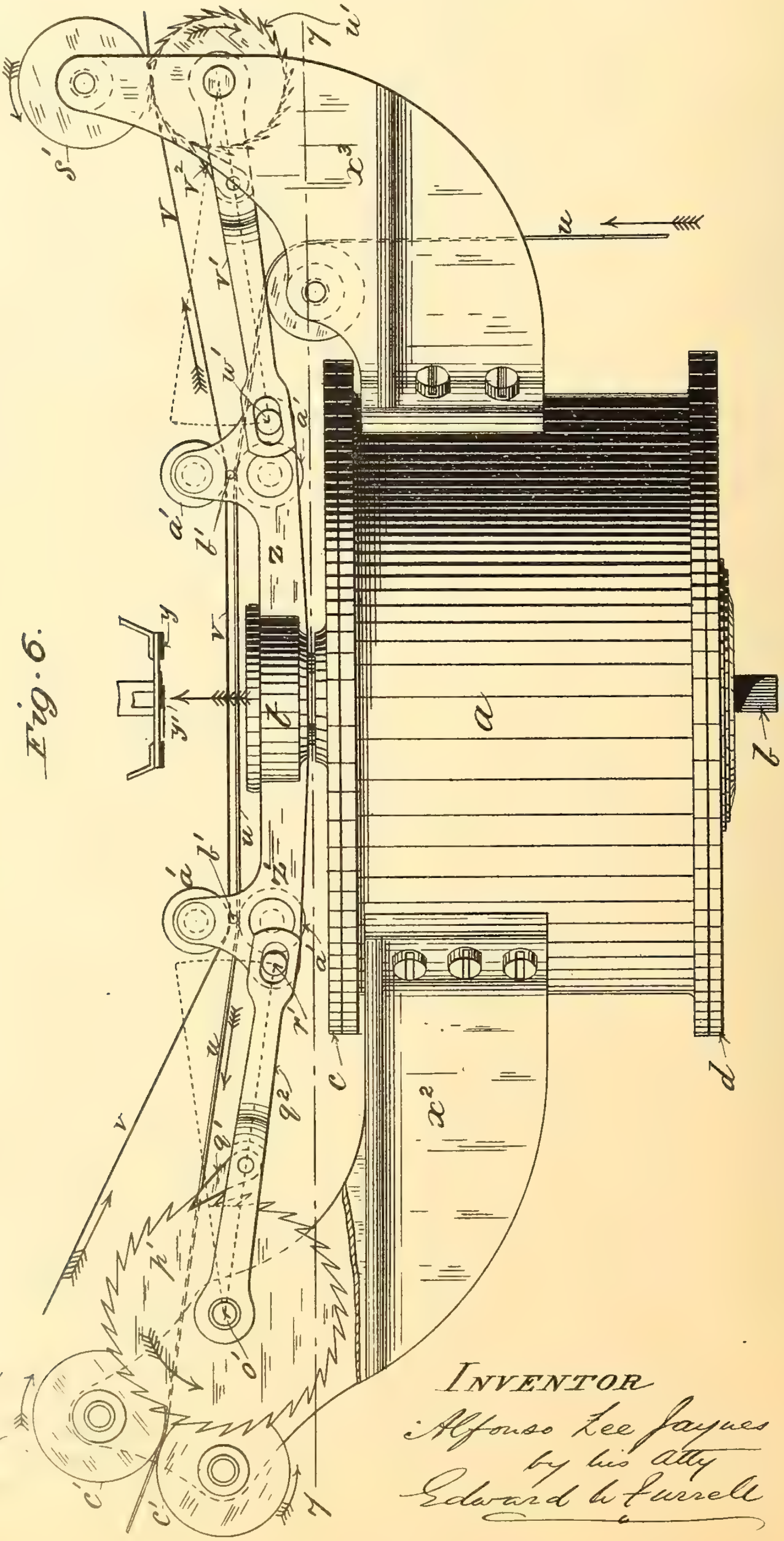
A. L. JAYNES.

WORKMAN'S TIME RECORDER.

No. 483,629.

Patented Oct. 4, 1892.

Fig. 6.



Witnesses

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(No Model.)

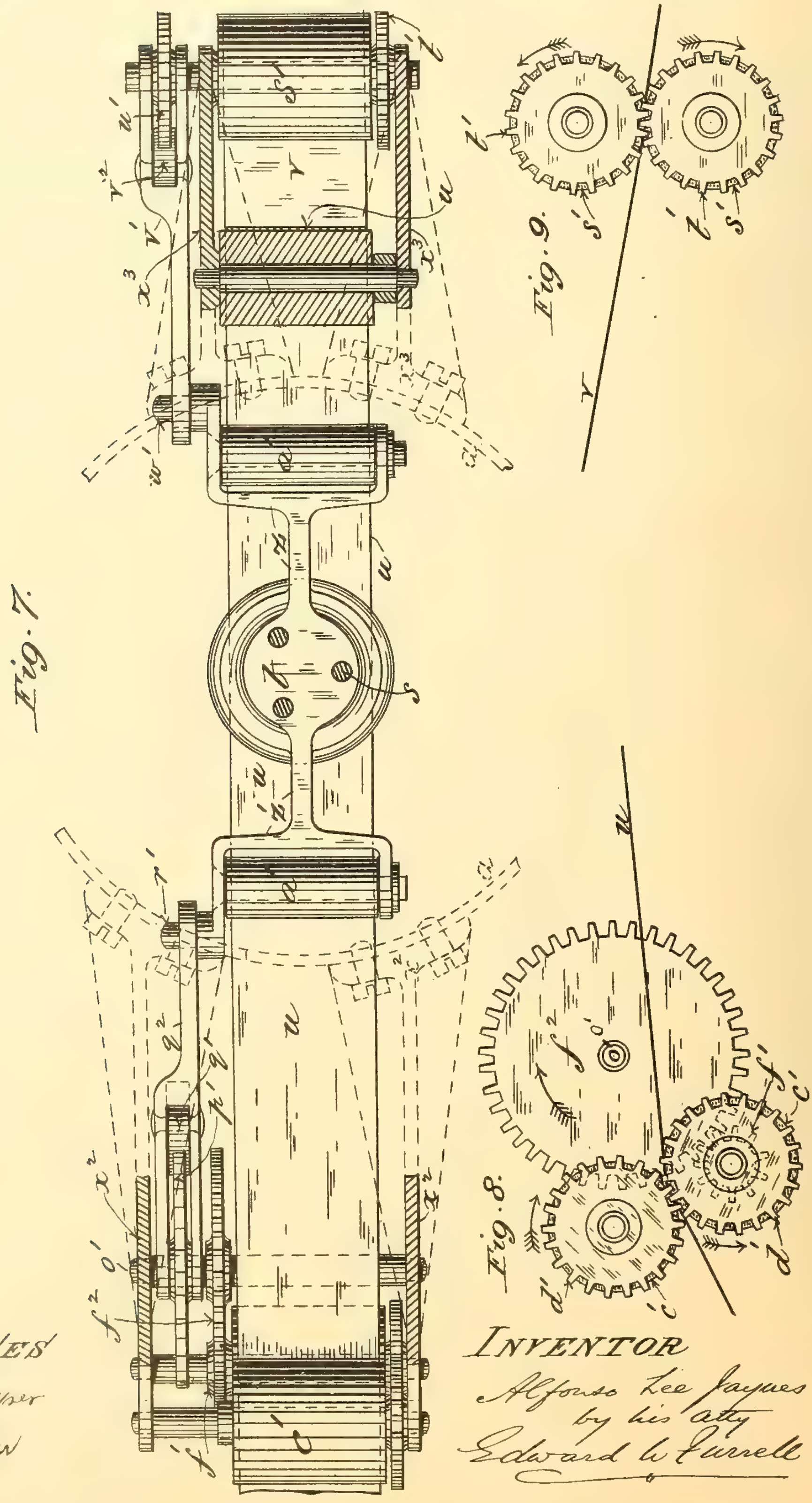
5 Sheets—Sheet 4.

A. L. JAYNES.

WORKMAN'S TIME RECORDER.

No. 483,629.

Patented Oct. 4, 1892.



WITNESSES

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(No Model.) 5 Sheets—Sheet 5.

A. L. JAYNES.

WORKMAN'S TIME RECORDER.

No. 483,629. Patented Oct. 4, 1892.

Fig. 11

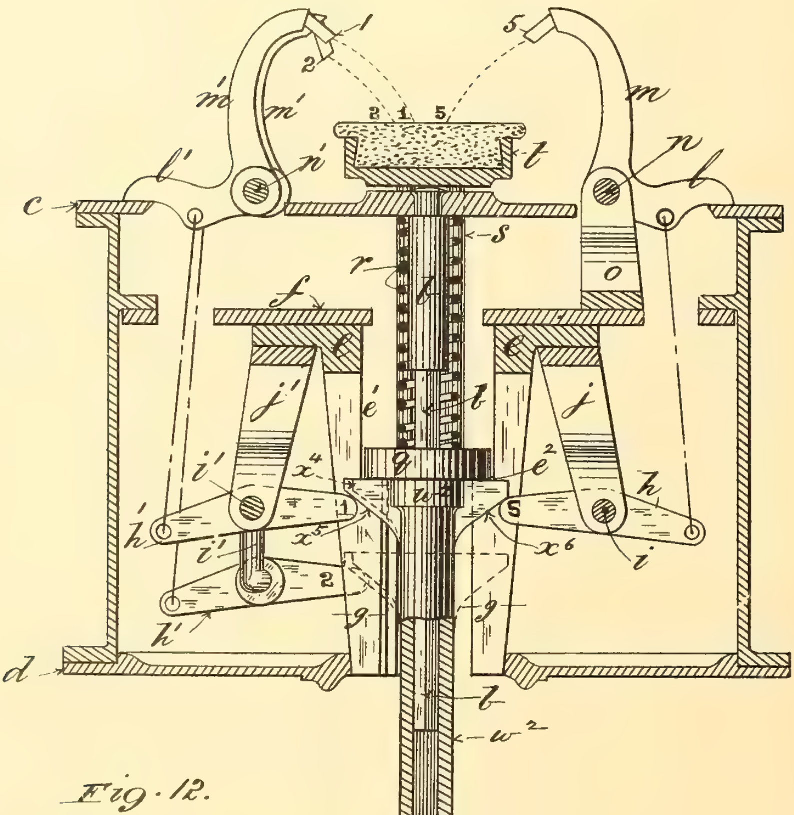


Fig. 12.

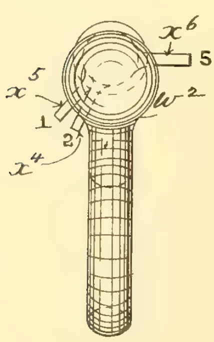
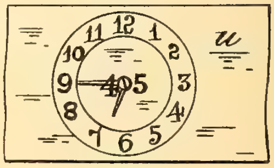


Fig. 10.



WITNESSES

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UNITED STATES PATENT OFFICE.

ALFONSO LEE JAYNES, OF ST. LOUIS, MISSOURI.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 483,629, dated October 4, 1892.

Application filed May 6, 1892. Serial No. 432,070. (No model.)

To all whom it may concern:

Be it known that I, ALFONSO LEE JAYNES, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a certain new and useful Improvement in Recording Apparatus, of which the following is a specification.

This invention, which may be used for various purposes, and particularly as a workman's time-recorder, relates to mechanism by which on the reciprocating movement of one or more of its parts the time at which such movement occurs and the number or other designating-mark assigned to the said part or parts are recorded.

In the accompanying drawings, Figure 1 represents a longitudinal section taken on line 1 1 in Fig. 2 of my improved recording apparatus arranged for use as a workman's time-recorder; Figs. 2 and 3, transverse sections thereof on lines 2 2 and 3 3, respectively, in Fig. 1; Figs. 4 and 5, side and end views, respectively, of the key shown in Fig. 1; Fig. 6, a side elevation of the apparatus at right angles to Fig. 1, showing the tape and ribbon mechanisms; Fig. 7, a transverse sectional view thereof on line 7 7 in Fig. 6; Figs. 8 and 9, side views of the gearing actuating the tape and ribbon rollers, respectively, as seen to the left and right of Fig. 7; Fig. 10, a view of the tape after receiving an impression to be recorded; Fig. 11, a similar view to Fig. 1, showing a modified arrangement of some of the parts seen on line 11 11 in Fig. 2; and Fig. 12, an end view of the key seen in Fig. 11.

Like letters and numerals of reference denote like parts in all the figures.

a represents a box or casing containing a central stem or other guide *b*, which is fixed at its rear end to the rear cover *c* of the casing *a*. The stem *b* may be circular for a suitable distance from its fixed end, and thence forward or outward of an isosceles triangular or other special shape to its free end, which projects somewhat beyond the front cover *d* of the casing *a*.

Around and concentric with the stem *b*, at a suitable distance therefrom, is preferably placed a tube or sleeve *e*, which is secured to a plate *f*, extending across and fixed to the casing *a*, intermediate to the front and rear covers *d c*. The central tubular space of the sleeve *e* around the stem *b* has an enlarged rear portion e', so as to form a shoulder e^2 at the front portion of the said space.

Through the wall of the sleeve *e* are slots *g*, which are radial to the stem *b* and extend longitudinally along the sleeve *e* to a suitable distance from its front or free end. These slots *g* correspond in number to a series of levers $h\ h'$ of the first order, the levers *h*, which are used for recording the single numbers "1" to "9," (or other desired marks,) being arranged to the right and the levers h' bearing the numbers "1," "2," and "1" to "9" (indicating, respectively, hundreds and tens) to the left of the stem *b*. The right-hand levers *h* are fulcrumed loosely on a spindle *i*, which is preferably radial to the stem *b* in a plane at right angles thereto and is supported by brackets *j*, projecting from the base of the sleeve *e* or plate *f*, as desired, and the left-hand levers h' to a similar fulcrum i', carried by brackets j'. The free ends of the levers $h\ h'$ enter, respectively, corresponding slots *g* of the sleeve *e* and may be vibrated freely along the said slots. The other ends of the levers $h\ h'$ are connected by rods $k\ k'$ to levers $l\ l'$ having arms $m\ m'$, which carry at their free ends types 1 2, and so on, corresponding, respectively, to the numbered levers $h\ h'$ and slots *g*. These levers *l m* and $l'\ m'$ are preferably located outside the rear cover *c* of the casing *a*, the levers *l m* being fulcrumed loosely on a spindle *n*, which is radial to a point at some distance to the right of the center of the stem *b* in a plane at right angles to the latter, and the levers $l'\ m'$ on a similar spindle n', radial to a corresponding point to the left of the stem *b*. The spindles $n\ n'$ are carried by brackets $o\ o'$, fixed to the plate *f* and projecting through the rear cover *c*. The free ends of the levers $l\ l'$ are normally held, preferably, against the outer side of the rear cover *c* by springs l^2, which connect the said levers to the casing *a*. The connecting-rods $k\ k'$, which work freely through the plate *f* and rear cover *c*, are capable of longitudinal extension and adjustment by spring and nut devices *p*, (or other means,) which, operating in combination with the levers $l\ l'$ and casing

a, normally maintain the levers h h' at a uniform level at their free ends within the slots g of the sleeve e.

Within the enlarged space e' of the sleeve e is placed a ring or other shoulder-piece q, which is preferably circular and movable along the stem b. The ring q is normally held against the shoulder e^2 of the space e' by a spiral spring r, which preferably surrounds the stem b between the near cover c of the casing a and the ring q. To the ring q are fixed the ends of rods s, which slide through corresponding holes in the rear cover c, beyond which they are fixed at their other ends to a block or plate t, having, preferably, a rubber or other cushion face, across which are held and caused to travel a tape u and inking-ribbon v, as hereinafter more particularly described.

The foregoing mechanism when used as a workman's time-recorder is operated by a key w or analogous instrument or by either of a series of such keys, each key being distinct and of separate construction, according to the respective numbers or marks to be represented and recorded thereby. Each key has a central hole or chamber corresponding to and closely fitting (but capable of sliding on) the triangular or other specially-shaped projecting portion of the stem b, so that the key can only be placed in one position on the stem b.

Projecting circumferentially from and preferably at right angles to the shank of each key at its open end or other suitable part is preferably a prong or other projection (or in lieu of a projection a slot may be used) or series thereof, corresponding in direction, when the key is placed on the stem b, to that of the levers h h' to be operated for recording the desired numbers or marks and to that of the slots g, which contain the said levers. For instance, the key w, (shown in Figs. 1, 2, 4, and 5,) has two opposite prongs x x' for registering the numbers "4" "5," so that on a workman represented by that number entering a factory and passing the key w onto the stem b the prongs x x' can only enter the opposite slots g, which contain the levers h h', indicating, respectively, the figures "5" "4," and on pushing the key w the prongs x x' strike the free ends of those levers on their front edges, thereby constraining the said ends of the levers 5 4 rearward, as shown by dotted lines in Fig. 1, and causing the connecting-rods k k' of the said levers to be extended (by means of the spring devices p) without affecting the corresponding levers l l', held against the rear cover c by the springs l^2, and their stamping-arms m m', carrying the types 5′ 4′. Meanwhile the prongs x x' have cleared the said ends of the levers 5 4 and the end of the key w strikes and pushes rearward the ring or shoulder-piece q, thereby compressing the spring r and pushing outward (by the rods s) the cushioned plate t, bearing the tape u and inking-ribbon v, until the latter are pressed upon the dial y (having raised type or other suitably-arranged numerals) and hands y' of a clock actuated by ordinary clockwork, and a record of the time at which the key w was inserted thereby impressed upon the tape u. On then withdrawing the key w the cushioned plate t and ring q are returned by the spring r to their normal positions or so that the ring q is stopped by the shoulder e^2, when the prongs x x' will have arrived against the free ends of the said levers 5 4 (which have meanwhile been returned to their normal positions by the spring devices p of the rods k k') on their rear edges, so that on the further retraction of the key w the said ends of the levers 5 4 are constrained into the forward (dotted) positions, which causes their connecting-rods k k' to push rearward their corresponding levers l l' and thereby throw their arms m m', having the types 5 4, forward into the dotted position against the inking-ribbon v, tape u, and cushioned plate t or so as to stamp the numbers "4" "5" upon the tape u within the previously-made impression of the clock-dial y and hands y', as shown in Fig. 10.

The tape u and inking-ribbon v may be held and moved across the face of the plate t as follows: z z' (see Figs. 6, 7, 8, and 9) are arms projecting from opposite sides of the cushioned plate t, and each carrying at its outer end a pair of rubber or other rollers a', having an intermediate fixed gage bar or pin b', between which and the rollers a', respectively, pass the tape u and inking-ribbon v, which are thereby held taut at the required distance apart across the face of the plate t. The tape u passes to the rollers a' at one side of the apparatus from a feed-roller (not shown) suitably mounted within the framework inclosing the entire apparatus or at any other convenient place, and from the opposite rollers a' on the other side the tape u passes between rollers c', having on their spindles engaging spur-wheels d' of equal diameter for insuring a uniform rotation of the rollers c'. On the spindle of one of the rollers c' is fixed a spur-pinion f', which is engaged by a spur-wheel f^2, having a spindle o', on which is fixed a ratchet-wheel p', engaged by a pawl q', which is carried by the ratchet-lever q^2, whose free end is engaged and controlled by a pin r', projecting from the arm z', so that on the movement of the plate t in the direction of the clock-dial y the ratchet-lever q^2 is moved to a similar extent and by its pawl q' partially rotates the ratchet-wheel p' in the direction of its arrow, thereby partially rotating spur-wheel f^2 and rollers c' in the direction of their arrows and so drawing the tape u from between the rollers a' and pin b' and removing the previously-impressed portion of the tape u from the plate t, whereby a fresh portion of the tape u is brought over the face of the plate t for receiving the next impression. By means of the spur-wheel f^2 and pin-

ion f' a multiplied movement of the stroke of the plate t toward the clock-dial y is imparted to the rollers c', this multiplied movement corresponding to that necessitated by the difference between the stroke of the plate t and the diameter of the clock-dial y or the length of tape u equivalent to this diameter for removal from the plate t preparatory to a fresh stroke and impression. It is evident that when the said stroke of the plate t is made equal to the diameter of the clock-dial the spur-wheel and pinion f^2 and f' may be dispensed with and the ratchet-wheel p' fixed directly on the spindle of one of the rollers c'. The inking-ribbon v, which may be moved in the opposite direction to the tape u, passes from a suitable feed (not shown) to the rollers a' between a pair of rollers s', having engaging spur-wheels t', which are actuated by a ratchet-wheel u' and ratchet-lever v', having the pawl v^2, the said ratchet-lever being engaged by the pin w', projecting from the arm z in a similar manner to the tape movement, except that the multiplying-wheel and pinion used for the latter are dispensed with, as only a small movement of the inking-ribbon v comparatively with that of the tape u is required. The tape and ribbon devices described are carried by brackets x^2 x^3, preferably secured to opposite sides, respectively, of the casing a.

It will be noted in the foregoing apparatus, first, that the cipher is not employed in the various combinations of numbers to be recorded, and, secondly, that neither of the two left-hand levers h', with their stamping-arms m', numbered "1" "2," for recording hundreds, can be used in combination with any other left-hand lever h' and arm m' (indicating tens) which on being operated simultaneously with the "100" or "200" lever and arm will interfere with or foul the latter on striking the plate t, so that the use of all the several combinations otherwise obtainable are restricted accordingly. The "100" and "200" stamping-arms m' are arranged to strike the plate t at a point to the left of that common to the other left-hand arms m'. If desirable to utilize the "100" or "200" stamping-arm m' with either of the said prohibited arms m', their interference, on striking the plate t, may be prevented by pivoting the "100" and "200" levers h' at a suitable distance forward from the remaining left-hand levers h', indicating tens, as shown in Fig. 11, whereby the "100" or "200" lever h' is operated by the key after the other lever h' of the combined number has been operated and the arm m' of the latter returned by the spring l^2 to its normal position or clear of the plate t. For example, the key w^2 (shown in Figs. 11 and 12) has three prongs x^4 x^5 x^6 for operating, respectively, the "200," "10," and "5" levers h' h and so recording the number "215." In like manner, for recording any single number or combination thereof within the range of the apparatus, keys are used having, respectively, a prong or prongs in the proper position for operating the lever or levers whose stamping arms and types correspond to the desired number or combination to be recorded.

It will be understood that I do not limit myself to the particular means hereinbefore described for holding and moving longitudinally the tape and inking-ribbon across the face of the plate t, as it will be evident to a skilled mechanic that these functions may be effected in various ways without affecting my invention.

I claim as my invention—

1. In a recording apparatus, the combination of a key or other instrument, a tape and inking-ribbon, a clock-dial, and a movable type, the said key or other instrument when moved in one direction forcing the tape and ribbon against the clock-dial and when moved in the other direction forcing the type against the ribbon and tape, substantially as shown, and for the purpose described.

2. In a recording apparatus, the combination of a key having a prong or other projection and movable along a stem or other guide, a tape and inking-ribbon, and a type carried by a pivoted lever, the said lever being connected to a pivoted lever actuated by the key, substantially as shown, and for the purpose described.

3. In a recording apparatus, the combination of a key having a prong or other projection and movable along a stem or other guide, a ring or other shoulder-piece movable along the stem and connected to a plate carrying a tape and inking-ribbon, a spring for returning the said plate and ring, a clock-dial, and a type carried by a pivoted lever, the said lever being connected to a pivoted lever actuated by the key, substantially as shown, and for the purpose described.

4. In a recording apparatus, the combination of a key having a prong or other projection and a pivoted lever, which is normally held in one position by a spring, the said lever being adjustably connected to a pivoted lever actuated by the lever, substantially as shown, and for the purpose described.

5. In a recording apparatus, the combination, severally, with a series of keys, each key having a prong or prongs and movable along a central stem or other guide, of a ring or other shoulder-piece, preferably surrounding and movable along the stem, the said ring being connected to a plate carrying across its face a tape and inking-ribbon, a clock-dial having hands actuated by ordinary clock-work, a spring for returning the said plate and ring, a fixed tube or sleeve surrounding and concentric with the stem and ring, the said tube having longitudinal slots corresponding, respectively, to a series of pivoted levers movable at one end along the said slots and adjustably connected to a corresponding series of levers carrying types or marks and adjustably connected to a fixed part of the apparatus, substantially as shown, and for the purpose described.

6. In a recording apparatus, the combination of mechanism for moving longitudinally the tape and inking-ribbon, comprising, respectively, the plate t, having oppositely-projecting arms z z', carrying rollers a' and intermediate pins b', pin r, engaging ratchet-lever q^2, having pawl q', ratchet-wheel p', spur-wheel f^2, and pinion f' for actuating the rollers c' of tape u, pin w', engaging ratchet-lever v, having pawl v^2, and ratchet-wheel u' for actuating the rollers s' of inking-ribbon v, substantially as shown and described.

ALFONSO LEE JAYNES.

Witnesses:

F. J. THOMAS,

W. V. MASSON.

(No Model.)

D. E. PURSELL.

TIME RECORDING MECHANISM.

No. 483,767. Patented Oct. 4, 1892.

Fig. 1

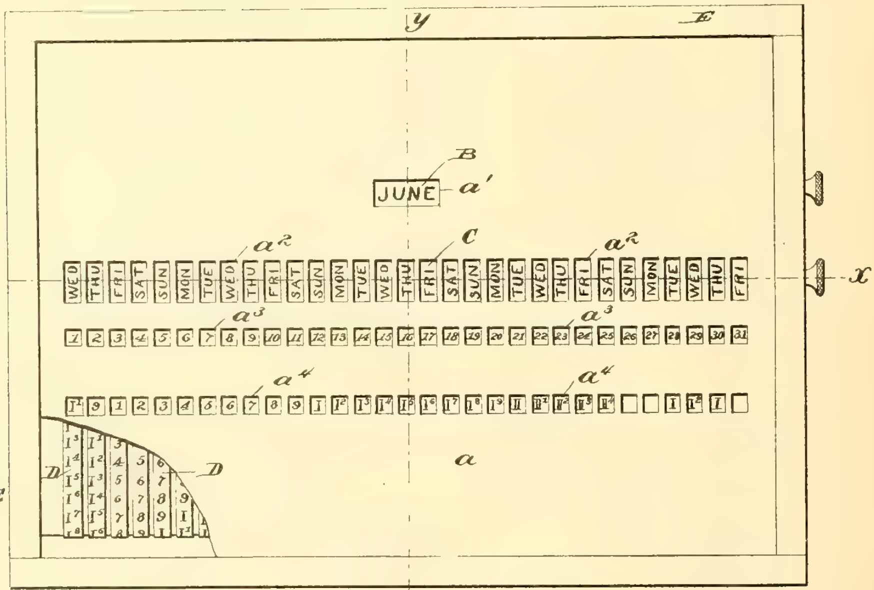


Fig. 2

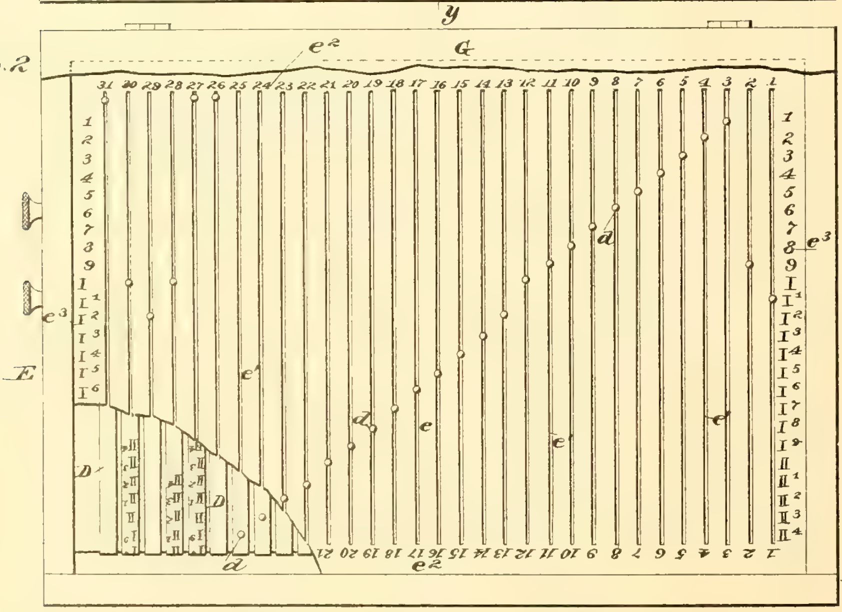


Fig. 3

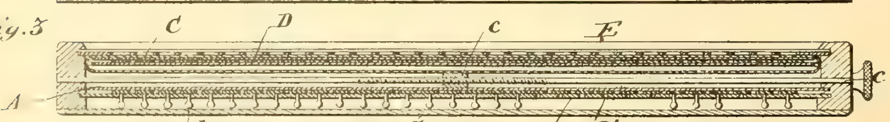


Fig. 4

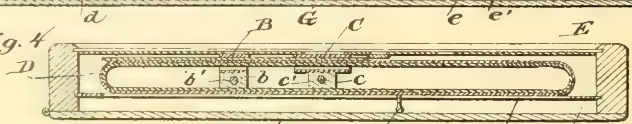


Fig. 5

Witnesses

J. F. Coleman

M. B. May

Inventor.

D. E. Pursell

by Doubleday & Bliss

Att'ys.

UNITED STATES PATENT OFFICE.

DAVID E. PURSELL, OF MAUCH CHUNK, PENNSYLVANIA.

TIME-RECORDING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 483,767, dated October 4, 1892.

Application filed July 1, 1892. Serial No. 438,714. (No model.)

To all whom it may concern:

Be it known that I, DAVID E. PURSELL, a citizen of the United States, residing at Mauch Chunk, in the county of Carbon and State of Pennsylvania, have invented certain new and useful Improvements in Time-Recording Mechanisms, of which the following is a specification, reference being had therein to the accompanying drawings.

The object of my invention is to provide a device for recording the time or the number of working hours made by mechanics and those engaged in railroading and similar occupations upon a certain day or date. To that purpose I have invented, and hereinafter claim and describe, a pocket perpetual calendar, upon which are arrangd traveling straps or bands bearing numerals indicating hours or days and fractions thereof, so that by comparing the recording-numerals with the calendar it can be determined at the end of a stated period how many days and hours the mechanic has worked.

In the drawings, Figure 1 is a face view of the calendar. Fig. 2 is a rear view. Fig. 3 is a section on the line x x, Fig. 1. Fig. 4 is a section on the line y y, Fig. 1. Fig. 5 represents one of the bands.

A represents a rectangular frame, which for convenience I have constructed of sheet metal, so as to have a hollow interior. Arranged longitudinally around one side of this frame and extending through its interior are two endless bands B C, each secured to a nut b c, mounted and working upon a screw-rod b' c', extending beyond the end of the frame. Each screw has a milled head which can be grasped to turn the screw and advance or retract the nut, thereby moving the traveling bands B C one way or the other. The band B has marked thereon the names of the months of the year, beginning with "January," while the band C has the days of the week in regular rotation for five or six weeks.

Running transversely around the frame A are thirty-one small endless bands D, upon which are noted the hours, beginning with one and ending with twenty-four, or as they are shown expressed in days they run from one to ten, which completes one day, and then from I′ to II⁴, as shown in Fig. 1. These bands have each a pin d projecting from the back of the frame, so that they can be grasped by the fingers. They each project through a slot e' in a rear plate e.

On the front of the frame A is a face-plate a, having an aperture a' over the band B of sufficient size that the name of but one month is visible. It has also a series of apertures a^2 over the band C, upon which the days of the week are noted. The face-plate a has in line with the apertures a^2 and parallel therewith a row of numerals a^3, corresponding to the days of the month and ending with the numeral "31." There is also a third set of apertures a^4, corresponding to the row of numerals a^3 and directly over the bands D, so that the hours on the said band may be seen through the apertures directly in line with the day of the week and the day of the month.

Upon examining Fig. 2 it will be seen that the rear plate has two rows of numerals e^2 e^2, corresponding to the bands D and to the rows of numerals a^3 on the other side, and also two other rows e^3 e^3, corresponding to the numerals on the traveling bands D. The last-said numerals are so spaced apart that when the pin d is in line with one of the numerals, say I^2, that number appears in the aperture a^4 on the other side of the frame.

The whole frame A, together with the face and the rear plates a and e, are inclosed in a light binding-frame E, there being glass or other transparent material over the face-plate and a lid or cover G to protect the pins d d, projecting through the slots in the rear plate.

It will be easily understood how the device is used. After the band B, on which are noted the months, has been shifted by means of the screw b' and nut b, so that the proper month appears in the aperture a', and the band C has been likewise moved by the screw c' and nut c until the days of the week correctly correspond to the numerals a^3 on the face-plate, the calendar is then ready for recording of time. As the ordinary working-day is ten hours, I prefer to note the time in days of ten hours each and fractions thereof, as five hours, one day and four hours, (or fourteen hours,) or two days and four hours, (or twenty-four hours,) as the employés of a railroad sometimes work twenty-four hours on a stretch, and are at such times entitled to be paid for two days and four hours of time. Suppose,

for example, on Wednesday, June 1, an engineer has made a run of eleven hours. He then by means of the pin d shifts the first of the bands D until the pin is in line with I' of the numerals e^3, the same numeral appearing in the first aperture of the row a^4 corresponding to that day and date. Then on June 2 he works but nine hours, the second band being shifted until "9" appears in the second aperture. He continues this to the end of the month, recording the number of hours and days worked, and at the end of the month he has a complete record of the time, together with the days and dates.

I do not wish to be construed as limiting myself to this exact construction and arrangement of parts, as there can be many variations made without affecting the spirit and scope of the invention.

I am aware of the fact that calendars have been used or proposed with a series of movable characters indicating the month of the year, together with a series of characters indicating the days successively of one or more weeks, and also a series of characters indicating the numbers of the days of a month, and in combination therewith a number of blank spaces adapted to have entries made thereon with pencil or pen to suggest the days on which should be performed certain acts, as the collecting or the paying of sums of money, and I do not claim such devices as of my invention; but the purpose of the device herein is entirely different. The object is not to provide a calendar or something to assist memory concerning a future matter, but to provide an assistant in keeping account of past matters, based particularly on fractional parts of a day of twenty-four hours—that is to say, provide a series of indicators of such nature that at the end of or at any time during a month an interested party can instantly ascertain the total number of hours of one or more days which have been devoted to some given object.

I believe myself to be the first to have provided a calendar having a series of characters for each of several days from which can be readily ascertained at any time the total number of hours, such as aforesaid.

What I claim is—

1. The herein-described method of recording time, it consisting in marking by means of interchangeable characters upon a calendar opposite the respective days of the week or month the hours of working time, said hours being expressed in days, and fractions thereof, of ten hours each, substantially as and for the purpose set forth.

2. In a recording device, the combination, with a determinate set of signs indicating the days of the week, of devices, substantially as set forth, for indicating the hours, as described.

3. A recording device having a determinate set of signs or symbols indicating days of the month or week and movable devices for indicating the hours of such days, substantially as shown and described.

4. In a recording device, the combination, with a frame having a row of symbols for indicating the days, of a set of movable bands respectively opposite the said row of symbols and having thereon symbols indicating hours, substantially as set forth.

5. A recording device having a frame, a movable month-indicator, a day-indicator, and movable devices for indicating the hours of the day, substantially as set forth.

6. The combination, with the frame, a traveling band for indicating the months, and a traveling band for indicating the days, of bands, one for each day of the month, for indicating the hours, substantially as set forth.

7. The combination, with the frame having a determinate set of symbols indicating days, of devices, one for each day, having symbols indicating hours and movable relatively to said set of symbols, and means for moving said devices, substantially as set forth.

8. The combination of the frame, the longitudinally-moving band indicating the month, the longitudinally-moving band indicating the days, and transversely-moving bands for indicating the hours, substantially as set forth.

9. In a calendar, the combination of a series of characters indicating months adapted to have each month distinguished from the others, a series of characters indicating the days of the month, and a series of sets of characters arranged, respectively, opposite to the characters of the second aforesaid series and those of each of the last said sets indicating one or more fractional parts of a day, substantially as set forth.

10. In a calendar, a series of movable indicators, each provided with characters indicating fractional parts of a day and each being in whole or in part a duplicate of another or others and arranged to move parallel to each other, substantially as set forth.

11. In a calendar for indicating fractional parts of a day, a series of indicators which are in whole or in part duplicates of each other and have characters indicating fractional parts of a day, a series of characters indicating months and adapted to have each month distinguished from the others, and a series of characters indicating the days of the month, substantially as set forth.

12. In a calendar for indicating fractional parts of a day, a series of characters indicating the days of the month, and a series of sets of characters respectively opposite the aforesaid characters, those of each set comprising characters of two distinguishable kinds, respectively, adapted to indicate different fractional parts of a day, substantially as set forth.

13. In a calendar, a series of duplicate movable indicators, each provided with characters indicating fractional parts of a day, and a series of characters indicating entire successive

days, respectively, opposite to said indicators, substantially as set forth.

14. In a calendar, a frame or holder, a movable indicator supported therein and having a series of characters, of which one or more are visible from the front side of the calendar, means for moving the indicator, and a duplicate stationary set of characters behind the calendar to guide in moving the indicator, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID E. PURSELL.

Witnesses:

FREDERICK BERTOLETTE,

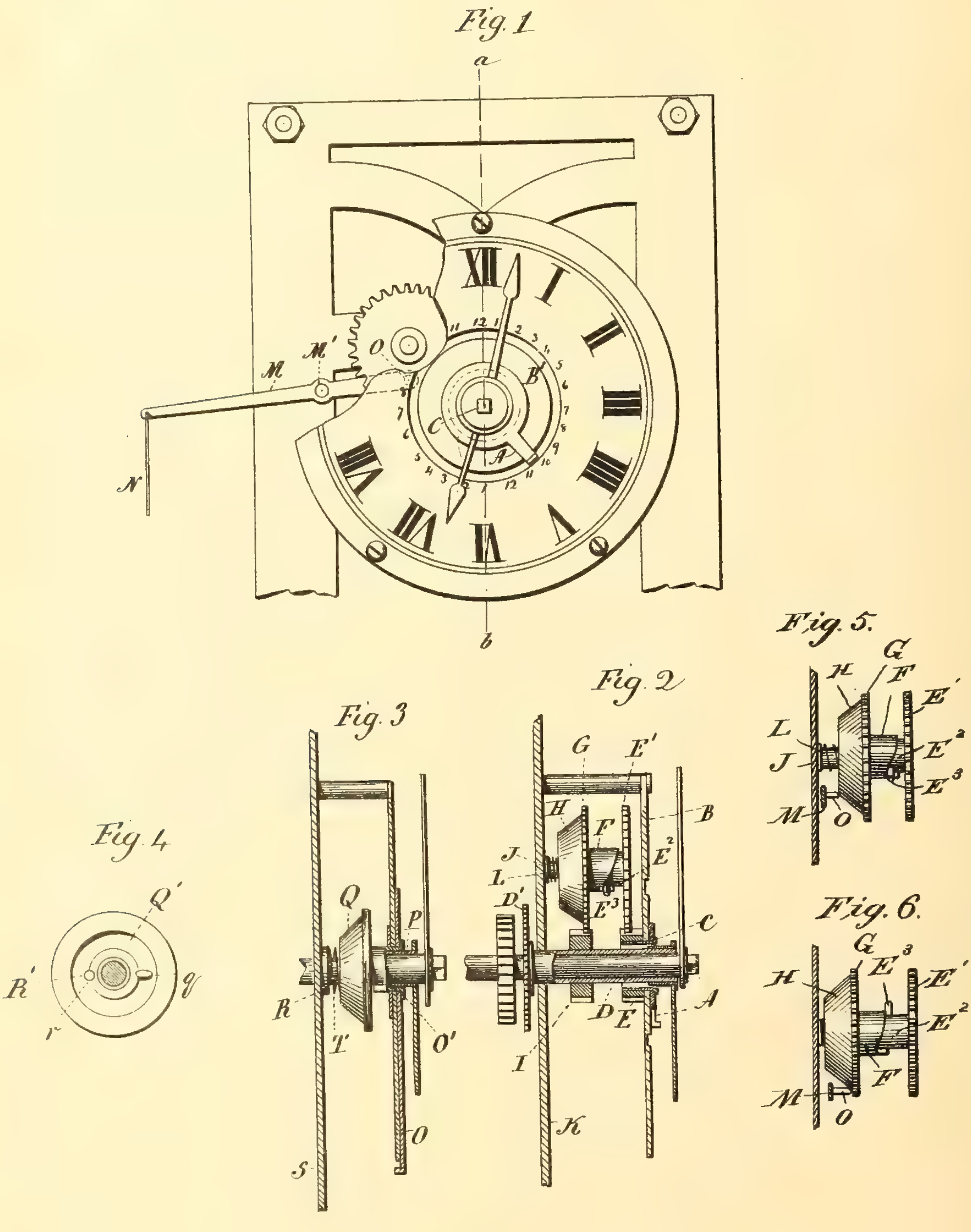
DAVID H. BARBER.

(No Model.)

W. E. PORTER.

ALARM CLOCK.

No. 484,236. Patented Oct. 11, 1892.



Witnesses

J. H. Shumway

Fred W. Peck

Wilson E. Porter, Inventor

By atty. Earle & Seymour

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILSON E. PORTER, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE NEW HAVEN CLOCK COMPANY, OF SAME PLACE.

ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 484,236, dated October 11, 1892.

Application filed May 31, 1892. Serial No. 434,857. (No model.)

To all whom it may concern:

Be it known that I, WILSON E. PORTER, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Alarm-Clocks; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a view in front elevation of the time mechanism of an eight-day clock containing my invention; Fig. 2, a view thereof in vertical section on the line *a b* of Fig. 1; Fig. 3, a similar view of the time mechanism of a twenty-four-hour clock containing my invention; Fig. 4, a detached view, in front elevation, of the cone of the mechanism shown in Fig. 3; Fig. 5, a detached view, in side elevation, to show the elevated position of the inner end of the lever M just after the cone has been jumped forward consequent upon being released by the presentation of the drop of the cam-sleeve F to the pin E^3, which is driven by the movement; Fig. 6, a similar view showing the depressed position of the inner end of the said lever when the cone is pushed back by the action of the said pin upon the cam-sleeve.

My invention relates to an improvement in that class of alarm-clocks in which the alarm mechanism is organized independently of the time mechanism which releases it through the medium of a wire or cord, forming their only connection, the object being to produce a device simple and durable in construction, adapted to be set not only with ease, but also so as to go off on the minute instead of somewhere about a predetermined time, which is an objection to many of the alarm-clocks now in use.

With these ends in view my invention consists in an alarm-clock having certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As shown in Figs. 1 and 2 of the drawings, the hand A, by which the alarm is set, is secured to the outer end of a sleeve C, frictionally mounted within the central opening of the dial B and made sufficiently large to clear the socket D of the hour-wheel D′ of the time mechanism. As shown in the said figures of the drawings, the dial is provided with a concentric alarm-dial B′, graduated in some approved manner that will readily enable the hand A to be set as desired. I have shown the said dial B′, graduated from "1" to "12" and from "1" to "12" again; but this graduation may give way to any other found to be more convenient; or, if preferred, the hand A may be made long enough to be set in conjunction with the regular graduations of the dial. As shown in the said figures of the drawings, the inner end of the sleeve C is furnished with a pinion E, which meshes into a wheel E′, having a sleeve E^2, carrying a radially-arranged pin E^3. The said hand, pinion, wheel, sleeve, and pin are normally at rest, being moved only when the hand is manually adjusted. In this respect the hand A, by which the alarm is set, is different from the alarm-dial extensively employed heretofore for setting alarm mechanisms and mounted upon the socket of the hour-wheel, and therefore rotating therewith. The said pin E^3 co-operates with the cam-edge of a sleeve-cam F, which is combined with a wheel G and a cone H, the said wheel G being rotated once in every twenty-four hours, and thereto meshing into a pinion I of half its number of teeth, mounted on the socket D of the hour-wheel D′, before mentioned. The combined sleeve-cam, wheel, and cone are mounted upon a stud J, having bearing in the front plate K of the movement, and also supporting the wheel E′. A spiral spring L, interposed between the outer face of the said plate and the cone H, exerts a constant effort to move the described combined part laterally on the stud J and force the edge of the cam-sleeve F into contact with the pin E^3. The said cone H is engaged by the inner end of the lifting-lever M, which is pivoted to the said movement-plate by a pivot M′ and connected by a wire N, attached to its outer end, with the alarm mech-

anism, which may be of any approved construction, but which is not shown herein.

By employing a cone to co-operate with the lifting-lever it will be apparent that the character of their engagement is made entirely independent of the position of the cam-sleeve and pin. In this respect my invention is to be distinguished from prior alarm mechanisms in which the lifting-lever has been engaged with the edge of a snail-cam, which as it is rotated presents an irregular edge to the said lifting-lever.

In operating my improved alarm mechanism as above constructed the hand A is set by means of the inner or outer circle of graduations on the dial, whereby the pin E^3 is changed in position with relation to the edge of the cam-sleeve F′, driven by the time mechanism. When now the said time mechanism brings the drop of the cam-sleeve under the pin, the spring L will throw the combined part forward and permit the inner end of the lifting-lever to rise, whereby its outer end falls and releases the alarm mechanism.

The foregoing description applies to the application of my invention to that class of alarm-clocks which with one winding sound the alarm for a plurality of days, and which therefore require that the alarm be released only once in twenty-four hours, wherefore the cone must be located to one side of the center arbor of the clock. To this class of clocks belong, for instance, eight-day alarms—*i. e.*, clocks that alarm eight successive days without rewinding. On the other hand, in adapting my invention to one-day alarms—that is, alarms that only go off once for one winding—and whether applied to clocks that run one, eight, or any other number of days, the cone is mounted on the center arbor and is rotated once in twelve hours. In the class of clocks last mentioned that is no objection, as the alarm runs down in one sounding, so that the tripping of the alarm after it has once gone off is of no effect unless it has been wound. In these clocks care must of course be used in setting and winding the alarm, so that it will not go off too soon and in the early-evening instead of the early-morning hours. A clock of this class is shown by Figs. 3 and 4 of the drawings. The alarm is set by a large hand O, secured to the outer end of a cam-sleeve O′, frictionally mounted in the central opening of the dial and made large enough to clear the socket P of the hour-wheel, which is not shown, the inner end of the said sleeve being cammed. The cone Q, which is mounted on the center arbor with a capacity for lateral movement thereon, has an annular recess Q′ formed in its outer face, as shown by Fig. 4 of the drawings, to receive the inner end of the said cam-sleeve, a pin q being located within the said recess to co-operate with the said end of the sleeve. A collar R, mounted on the socket P of the hour-wheel and having bearing against the outer face of the front movement-plate S, is furnished with a forwardly-projecting pin R′, which enters an opening r, formed in the cone, whereby the cone and collar are coupled together for the rotation of the former with the said socket. A spring T, interposed between the collar and cone, moves the same laterally on the socket and keeps its pin Q in engagement with the cammed edge of the sleeve O′. This construction also calls for a lifting-lever corresponding to the lever shown in Fig. 1, but not shown in this figure. As the operation of this modified construction is the same in principle as the operation already described, it will not be detailed.

An alarm mechanism having a hand is very much more readily set than an alarm mechanism employing a dial-wheel, which must be grasped by the tips of the fingers, and is so tightly frictioned upon the socket of the hour-wheel that it turns with difficulty. Moreover, a much closer setting of the mechanism may be secured by means of a hand than by means of a wheel which it is difficult to turn so as to bring any figure upon it into exact alignment with any graduation upon the face of the dial.

In the construction shown by Figs. 1 and 2 of the drawings the pin is connected with the alarm-setting hand, while the sleeve-cam, which co-operates with the pin, is driven by the time mechanism. It will be observed, on the other hand, that in the construction shown by Figs. 3 and 4 of the drawings the pin is driven by the time mechanism and the sleeve-cam connected with the hand. It will thus be seen that a reversal of those parts in position does not affect my invention. I would therefore have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a time mechanism and a dial, of a hand frictionally mounted in the central opening of the latter, a cone driven by the said mechanism and movable on its shaft, a pivotal lifting-lever engaging with the said cone, a sleeve-cam, a pin to co-operate therewith, one being connected with the said cone and the other with the said hand, and a spring for moving the cone in one direction on its shaft, substantially as described.

2. The combination, with a time mechanism and a dial, of a hand frictionally mounted in the central opening of the latter, a pinion connected with the said hand, a wheel meshing into the said pinion and constructed with a sleeve carrying a radially-arranged pin, a

laterally-movable combined sleeve-cam, cone, and wheel, whereof the latter is meshed with a member of the time mechanism and the cam arranged to present its edge to the said pin, a spring for moving the said combined cam, cone, and wheel toward the said pin, and a lifting-lever engaged with the said cone, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WILSON E. PORTER.

Witnesses:
FRED C. EARLE,
GEORGE D. SEYMOUR.

(No Model.) 2 Sheets—Sheet 1.

J. A. TILDEN.

WATCHMAN'S ELECTRIC TIME RECORDER.

No. 485,591. Patented Nov. 1, 1892.

Fig. 1.

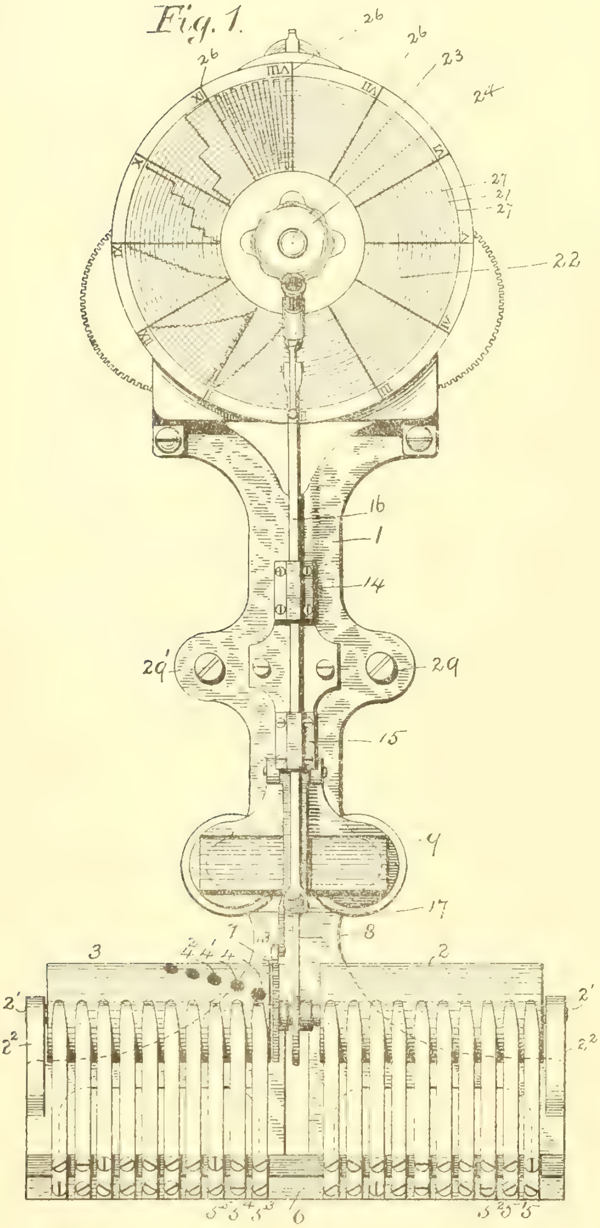
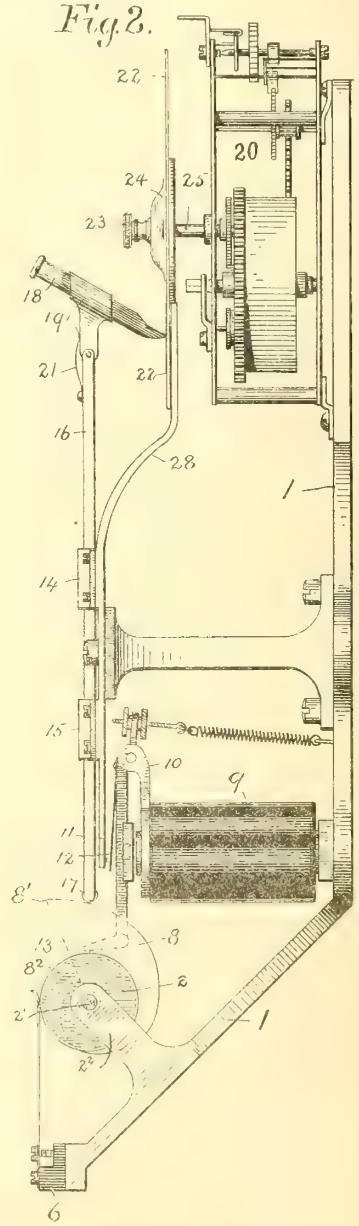


Fig. 2.



Witnesses:
Frank C. Fowler
Wm. J. Smith

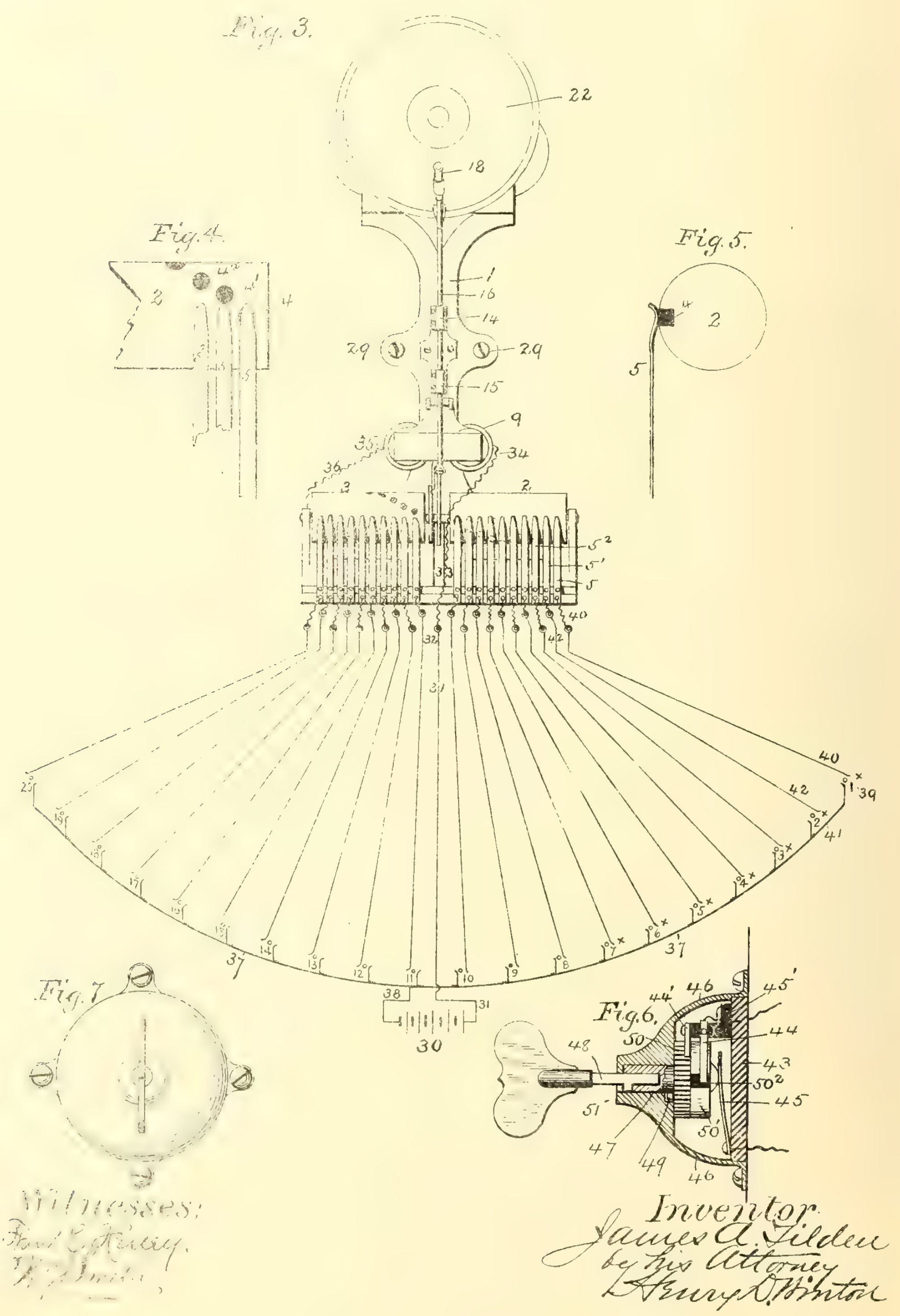
Inventor:
James A. Tilden
by his Attorney
Henry D. Winton

(No Model.) 2 Sheets—Sheet 2.

J. A. TILDEN.

WATCHMAN'S ELECTRIC TIME RECORDER.

No. 485,591. Patented Nov. 1, 1892.



UNITED STATES PATENT OFFICE.

JAMES A. TILDEN, OF HYDE PARK, ASSIGNOR TO THE HERSEY MANUFACTURING COMPANY, OF BOSTON, MASSACHUSETTS.

WATCHMAN'S ELECTRIC TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 485,591, dated November 1, 1892.

Application filed June 22, 1892. Serial No. 437,671. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. TILDEN, a citizen of the United States, residing at Hyde Park, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Watchmen's Time and Station Recording Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

This invention relates to a device for recording by diagram the movements of a watchman in his rounds from one place to another in the care of property, such diagram being governed at stations or fixed points by means of circuit-closing keys.

The invention consists of certain mechanism controlled by an electro-magnet which records upon a dial the exact station operated by the watchman, the time of its operation being indicated by a clock in the usual manner.

Referring to the drawings, Figure 1 is a front view of the machine. Fig. 2 is a side view of the same. Fig. 3 is a front view of the machine, showing the diagram of circuits for controlling the same. Fig. 4 is a detail of a portion of the controlling-cylinder forming part of the machine. Fig. 5 is a side view of the same. Fig. 6 is a sectional view of the circuit-closing key which I use in connection with this machine. Fig. 7 is a front view of the same.

Referring to Fig. 1, 1 is a frame upon which the operative mechanism is mounted.

2 is a cylinder made, preferably, of brass tubing and mounted upon a shaft 2′, which is held in bearings 2^2, forming part of the main frame 1 and free to turn in these bearings.

3 is a cylinder precisely like the other, mounted in the same relation and upon the same shaft, and is, in fact, a continuation of the same cylinder. These cylinders are provided with insulating-plugs 4 4′ 4^2, placed spirally on the surfaces of the cylinders, and there are as many of these plugs as there are stations. In the machine here described I have represented twenty stations. Consequently there are twenty of these plugs, beginning at any point of the cylinder 2 and running spirally to the end of the second cylinder, ten plugs in each cylinder.

5 5′ 5^2 5^3 5^4 5^5 represent metallic springs mounted upon an insulating-base 6, secured to the main frame, the springs resting upon the cylinder with a slight pressure, so that electrical contact is made with the cylinder. The plugs, heretofore referred to, in the cylinder are placed in line with the end of these springs in such a way that as the cylinder revolves the springs will come in contact with the plugs one after another in the order of their spiral form, thus successively breaking the electrical contact. On the same shaft on which the cylinders are mounted is a ratchet-wheel 7, which when operated upon by a ratchet, which will be described later, will cause the two cylinders to rotate. Upon the same shaft is also placed a cam 8 of such shape as to gradually lift an arm which will be later described, as the cylinders rotate.

9 is an electro-magnet mounted upon the frame 1, upon the front of which is a support-casting 10, (referring to Fig. 2,) upon which is hung an armature 11, which is provided with a contact-spring 12, all arranged so that when said magnet 9 is vitalized it will cause the armature to vibrate in a similar manner to the vibration of an electric bell of ordinary commercial construction. Upon the end of this vibrating armature is a ratchet 13, which engages with the ratchet-wheel 7 and causes it to give a continuous rotary motion to the cylinders and cam so long as the magnet continues to be vitalized.

Mounted in guides 14 15 is an arm 16, upon the lower end of which is a roller 17, which rests upon the cam 8, so that as the cylinders and cam are rotated by the operation of the magnet this arm 16 is gradually lifted until it reaches the end of the cam 8′, when it drops to the lowest point 8^2, ready to start again, so that in each revolution of the cam the arm is lifted a given distance, governed by the form of the cam. Upon the upper end of the arm 16 is a pen 18, preferably formed of glass and fitted into a holder 19, which is pivoted upon the end of the arm 16 and maintained in its position against a dial 22 by means of a delicate spring 21. Upon the

frame 1 is mounted a clock-movement 20, of the ordinary commercial form, adapted to revolve a dial 22, which is secured upon its main spindle 25 once in twelve hours. This clock mechanism requires no particular description, as it is of a well-known construction and is used in other forms of recorders. The dial which I preferably use is a circular disk 22, which can be easily replaced by removing the thumb-screw and pressure plate 23 24, which hold it upon the spindle 25 of the clock. It is divided into twelve different parts by division-lines 26 26 26, and so on, representing the twelve hours in the day, and they are so marked by figures on the outside edge. It is then divided by circular lines into divisions in numbers corresponding to the number of stations for which the clock is arranged, there being twenty circular division-lines 27 27 27 in the dial shown. An arm 28 is projected up behind the dial in order to give it a backing to support it against the pressure of the pen. The whole apparatus assembled together as described is held in a case by means of the screws 29 29′, so that it can be placed in the office or counting-room out of reach of the watchman and where the dials are placed upon it and kept on file. It will be very readily seen that when the cylinder 2 is rotated by means of the electro-magnet the cam mounted upon the spindle will lift the arm carrying the pen and cause a line to be drawn upon the dial radially to the center and to a distance corresponding to the diameter of the cam. If, for instance, the cylinder is revolved a short distance and then remains standing, a vertical line will be made upon the dial, and then as the clock revolves the dial a circular line will be drawn, and if the cylinders are revolved again a short distance another vertical line will be made, and so on, the radial line representing the time a station is visited and the circumferential line the time between stations.

Referring now to Fig. 3, upon which is a diagram of the circuits, a more complete description of the operation of the clock will be given.

30 is a battery located at any convenient point, one terminal of which is connected with the wire 31, which connects through binding-post 32 through wire 33 to one terminal of the magnet 34 and from the other terminal of the magnet 35 through the back contact-spring 12, which forms the vibrating contact of the armature, thence by wire 36 to the shaft upon which the cylinders are mounted, bringing them both into electrical connection with this wire. From this cylinder are various contact-springs 5 5′ 5^2, &c., which are connected by wires with the respective stations distributed throughout the premises, (indicated as stations 1^x 2^x 3^x, &c.,) and which include circuit-closing keys at the various points, which are connected by return-wires 37 and 38 to the other terminal of the battery. It will be seen now that if any circuit-closing key—such as 39, which is located at station 1—is operated a current will flow from the battery through the wires 38 37 and through the contact-key, through wire 40, through a spring 5, through the cylinder 2, through wire 36, through the magnet 9, wire 33, wire 31, to the other terminal of the battery, and the magnet 9 will become vitalized and cause the cylinder to rotate. It will continue to rotate until the insulated point upon its surface arrives opposite the contact-spring 5, when the circuit will be immediately cut out and cause the magnet to be devitalized and the apparatus will stand still. This will be better understood by reference to Figs. 4 and 5, in which it will be seen that the spring 5 directly over the insulated point 4 breaks the electrical continuity of the circuit. The pen, which is resting against the dial, has been lifted by the rotation of the cylinder and its cam a distance equal to one of the spaces upon the dial, which represents one station. Now, of course, if the watchman then proceeds to station No. 2 and operates that key a circuit will be established from the battery through wire 38, wire 37, contact-key 41, wire 42, through spring 5′, through the cylinder, through wire 36, magnet 9, wire 33, wire 31 to the battery, and it will cause the cylinder to make a further revolution until the insulating-point has arrived opposite the spring, where it is again cut out and causes the apparatus to stand still. During the lapse of time between the operation of the key at station 1 and station 2 the dial has been rotating, and therefore records the time between stations by the circumferential line, which time can be readily ascertained by dividing the dial into divisions of minutes—five minutes, or whatever may be desired. The same operation will take place when the watchman operates the next key. The cylinder will be rotated until the insulating-point arrives opposite its spring, when the circuit will be cut out and the apparatus cease to move. When the stations are operated in regular succession in the order of their numbers, a diagram will be made upon the dial in a regular step-by-step line. If, however, the watchman should proceed out of the regular order of the numbered stations, an irregular diagram would be given in the following manner.

Having operated two stations as we have just described, if he should proceed to station 10 and operate its key the continuity of the circuit would be maintained upon the cylinder until it has rotated a sufficient distance to bring the insulated point opposite the spring, and as a result the cam will have traveled through a greater distance and cause the pen to be lifted farther up on the dial until it has reached the space indicating station "10" upon the dial—that is, the cylinder would revolve until it cut out the spring representing station "10." It can be readily seen by the above description that this apparatus is arranged so that it records precisely the move-

ments of the watchman. Whether he operates the keys in the precise order of their arrangement or whether he takes them in any erratic order, a perfect diagram of the stations at which he operates the key will be recorded and also the time elapsing between the visits to the different stations. In order that the circuit may be closed a sufficient time to provide for the full revolution of the cylinder covering all the stations, so that the watchman may operate in any order, I provide a specially-arranged key, which is shown in Figs. 6 and 7 and is constructed as follows: 43 is a base upon which is mounted a spring 45, which is in connection with one wire forming part of the circuit, and upon the base is mounted a case 46, in which is located a stud 47, which can be pushed in and rotated by means of a key 48. This stud is provided with a pin 49, which rests in a slot made in the case 46. When the key has been pushed in, this pin will slide over the flat surface of the case until it comes opposite the slot, where it will drop in, so that it will always rest in one place. On the end of this stud is a ratchet-wheel 50 and a circular disk 51′, in which is an insulated strip 50^2. Mounted upon the base is a support 45′, to which is secured a contact-spring 44. This spring is connected with the other wire forming part of the circuit. There is also mounted upon this support a ratchet 44′, which engages with the ratchet-wheel 50, so that it will allow the key to be turned only in one direction. The spring 45 is always in metallic contact with the circular disk and the spring 44 is insulated from it, except during the time the key is being turned, when it rubs upon the metallic surface and causes the two ends of the circuit to be brought into metallic contact. The operation is precisely this: The key is placed into an elongated hole like that usually formed for keys in locks and when it is depressed and turned metallic connection between the two wires forming part of the circuit will be established during the complete turning of the key and the key must be turned the whole revolution before it can be withdrawn. When the complete revolution has been made, the pin 49 drops back into the opening or slot in the case 46 and the connection is cut out between the circular disk and the spring 45. This operation allows ample time for the current to operate the cylinder a complete revolution, as the electromotor operates to move the cylinder very rapidly, so that the record would be complete if the watchman should operate station 1 and then 20.

The whole apparatus as described forms a very simple, compact, and effective recording apparatus. Modifications may be made in the apparatus without departing from the principle of its construction and operation—such, for instance, as the use of a series of notched disks in lieu of the insulated points for breaking the contact at the ends of the springs. Spring-motors controlled by magnets of different construction to that shown for moving the cylinders can be arranged. Disks can also be used in lieu of the cylinders, such disks being provided with insulated points and rotated against contact-springs. These modifications are fully included in my invention. I do not claim as my invention a recording device to be operated by a step-by-step movement to obtain record of the location of the operator, as I am not confined to any particular order of operation to obtain a correct record of the movements of the operator.

Having thus fully set forth and described my invention, what I desire to secure by Letters Patent is—

1. The combination of a cylinder operated by a motor controlled by electrical contact, the said cylinder being in contact with a series of spring-current brushes and provided with a series of insulating-points which pass under, successively, said spring-brushes, whereby the motor is devitalized by the cutting out of the current and the cylinder caused to stop at the point determined by the spring so cut out, and a marking device controlled by said cylinder, which will indicate the relative location to each other of the several insulated points on the cylinder as they become cut out and the cylinder comes to rest, substantially as set forth and described.

2. The herein-described electric time and station recording apparatus, composed of an electro-magnetic motor in electrical connection with a series of circuit-closers, a series of insulated circuit-breakers located in the circuit of said station-keys and controlled by the operation of said motor, a cam controlled by said motor to operate a marking pen or pencil, a clock-movement carrying a recording-dial in such relation to the pen or pencil, so combined that a diagram will be traced upon the dial representing the operation of the station-keys and the time of their operation, substantially as set forth and described.

3. The herein-described time and station recording apparatus, composed of an electro-magnetic motor controlled by circuit-closing keys, a series of circuit-breakers arranged to interrupt the motor-circuit in successive order by the operation of said motor, and a cam arranged to rotate with said circuit-breakers and formed to lift a recording-pen which traces upon a dial mounted upon a clock-movement the exact movement of the arm and also the movement of the dial, substantially as set forth and described.

4. A watchman's electric time and station recording apparatus composed of an electro-magnetic motor, a cylinder or cylinders rotated by the action of said motor, spirally-arranged contact-breakers forming part of said cylinder or cylinders, a series of separately-insulated springs in contact with said cylinder or cylinders, an arm carrying a recording-pen governed by a rotating cam, and a clock-movement carrying a dial in such relation to

the marking-arm that a record is made of the movement of the marking-arm and the rotation of the dial, substantially as set forth and described.

5. An electric time and station recording apparatus composed of an electro-magnetic motor adapted to rotate a cylinder having spirally-arranged circuit-breakers upon its surface and carrying a cam formed to lift an arm upon which is a marking-pen, a series of insulated springs or arms in electrical contact with said cylinder and arranged to be insulated from the cylinder in successive order as it revolves by means of spirally-arranged contact-breakers, and a clock-movement carrying a recording-dial in such relation to the recording-pen that a diagram will be traced upon the dial corresponding to the movement of the pen and the rotation of the dial, substantially as set forth and described.

6. The combination, in a watchman's time and station recording apparatus, of an electro-magnet, a vibrating armature controlled by said magnet, a ratchet mounted upon the end of said armature, a ratchet-wheel mounted upon a shaft and engaging with said ratchet so that the operation of the vibrating armature causes a rotation of said shaft, a cylinder or cylinders mounted upon said shaft to rotate with it, a series of circuit-breakers spirally arranged upon said cylinder or cylinders, a series of separately-insulated contact-springs in electrical connection with said cylinder, a series of circuit-closers respectively in electrical connection with said contact-springs, a cam mounted upon the cylinder-shaft and rotating therewith, a sliding arm [illegible] upon said cam to be lifted by the cam-shaft, and a marking pen or pencil [illegible] upon the opposite end of said arm, [illegible] in relation to the marking [illegible] diagram will be traced upon a dial [illegible] operating with said [illegible] step-by-step movement the operation of the several station keys and time of their operation, substantially as set forth and described.

7. The combination, in a time and station recording apparatus, of a battery one terminal of which is connected with a series of circuit-closers, a series of electric wires leading from said circuit-closers to a series of separately-insulated circuit-breaking springs, a cylinder or cylinders mounted upon a shaft and in electric contact with said circuit-breaking keys, a series of insulated points arranged spirally upon said cylinder and in line with said springs, an electro-magnet one terminal of which is connected with said cylinder, the other terminal of which returns through a vibrating armature-spring to the battery, a ratchet-wheel mounted upon the cylinder-shaft and arranged to engage with a ratchet mounted upon the magnet-armature, a cam mounted upon the cylinder-shaft to rotate with it, a sliding arm resting upon said cam to move in accordance with the form of the cam, a pen or pencil hinged upon the opposite end of said arm, and a clock-movement and dial, the whole organized and assembled as described, so that by the operation of one of said circuit-closers the magnet would be caused to vibrate and rotate the cylinder until its corresponding circuit-breaker engages with the insulated point upon the cylinder and causes an interruption of the circuit, at the same time causing the marking-pen to be moved by the cam a distance corresponding to the circuit-closers operated and at the same time indicating by the diagram the interval of space between the operation of other circuit-closers, substantially as set forth and described.

8. The combination, in a time and station recording apparatus, of an electrically-controlled motor adapted to rotate a cylinder having spirally-arranged circuit-breakers upon its surface, a series of circuit-brushing springs in contact with said cylinder and arranged to come in successive contact with said breakers, a series of slow contact-keys in electrical connection with said brushes, constructed to occupy sufficient time in their operation to equal the time consumed in the complete revolution of the cylinder, a marking device controlled by said cylinder and arranged to record upon a dial placed upon a clock-movement the relative location to each other of the said circuit-breakers as they interrupt the passage of the current from the brushes to the motor, substantially as set forth and described.

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Witnesses:
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(No Model.) 2 Sheets—Sheet 1.

W. H. MARTIN.

TIME STAMP.

No. 485,639. Patented Nov. 8, 1892.

Fig. 1.

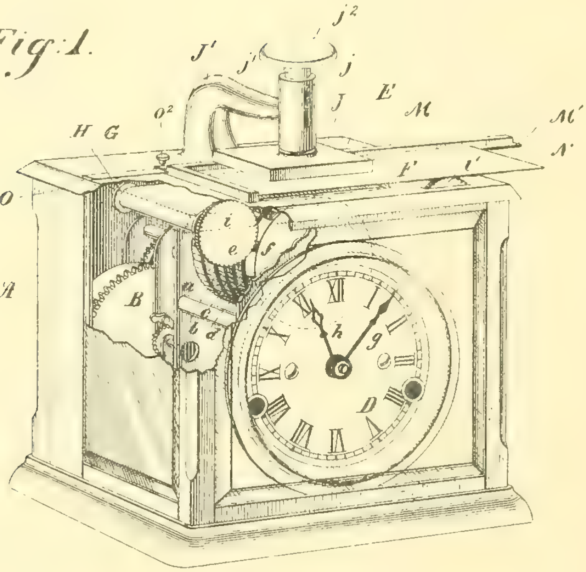
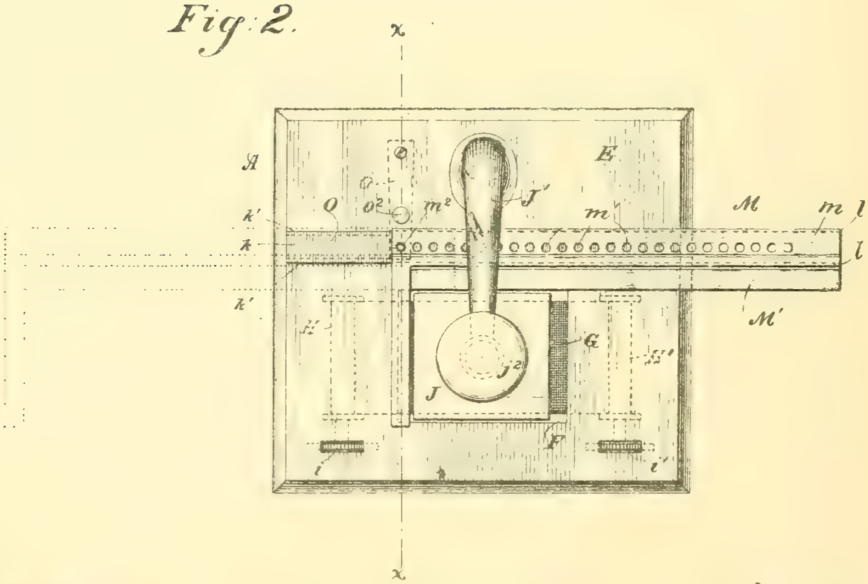


Fig. 2.



Witnesses.

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E. W. L. Blag

Inventor.

William H. Martin

By H. A. West

Attorney

(No Model.) 2 Sheets—Sheet 2.

W. H. MARTIN.

TIME STAMP.

No. 485,639. Patented Nov. 8, 1892.

Fig. 3.

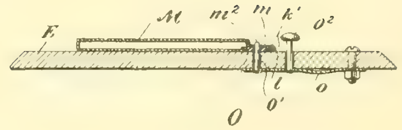


Fig. 4.

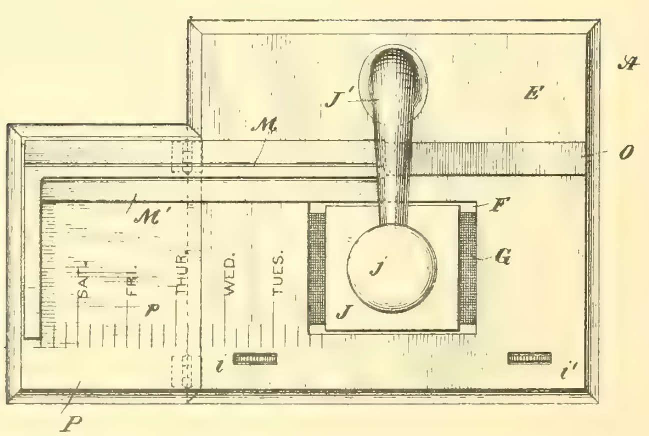
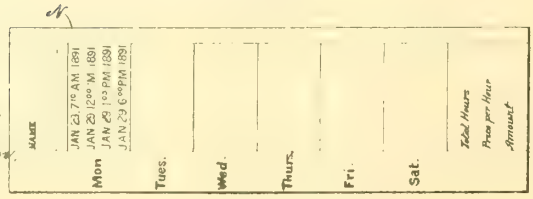


Fig. 5.



Witnesses.
John F. Nelson.
E. H. L. D. Blatz

Inventor.
William H. Martin
By H. A. West,
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM HENRY MARTIN, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE ACCURATE TIME STAMP COMPANY.

TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 485,639, dated November 8, 1892.

Application filed February 5, 1891. Serial No. 380,291. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY MARTIN, of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Time-Stamps, of which the fcllownig is a full, clear, and exact description.

My invention consists in the combination, with a time-stamp, of an adjustable gage applied to the casing of the stamp adjacent to the type-wheels and stamp-plate, so that by means of suitable cards and a proper sequence of adjustment of the gage an accurate registration of time may be kept upon the card for each day of the week, thus adapting the stamp for use in mills, shops, and other situations where the "time" of employés is kept.

In the accompanying drawings, Figure 1 is a perspective view of a time-stamp having my invention applied thereto, a portion of the casing of the stamp being broken away to show the clock mechanism, the type-wheels, inking-ribbon, and other mechanism. Fig. 2 is a plan view of the same. Fig. 3 is a detailed sectional view on the line x x of Fig. 2. Fig. 4 is a plan view showing a modification of the stamp casing and gage; and Fig. 5 is a plan view of the time-card, illustrating the method of stamping the same.

In the casing A, which may be of any appropriate form, is placed clock mechanism B, a series of type-wheels, and a clock-face D. The type-wheels, as here shown, are six in number a b c d e f, denoting, respectively, the months, days of the month, the hours, minutes, forenoon and afternoon, and the years. The said type-wheels and the hands g h of the clock are operated by the clock mechanism in the same or substantially the same manner as described in the patent to Charles Stahlberg, No. 424,369, dated March 25, 1890, and need not be here described. The top or cover E of the casing is slotted or cut away coincident with the type-wheels, as shown at F, and over the type-wheels in this opening is placed the inking-ribbon G, held on the paying-off and receiving rollers H H', journaled in bearings on the under surface of the cover and operated for shifting the ribbon by the milled nuts i i', which project through slots in the cover for convenience in turning said rollers.

J is the stamp-plate, held over the type-wheels and inking-ribbon in the sleeve j, formed as a part of the goose-neck J', attached to or formed upon the cover E. Its shank j' is provided with a knob j^2, and in the sleeve is placed a return-spring for lifting the stamp-plate in the well-known manner. To the top of the cover is attached an adjustable gage M for indicating a certain relative position at which the time-card N is to be placed upon the type-wheels to receive the impression. The gage is by preference L-shaped and adapted to be adjusted along the cover and held at different positions to stamp the card in different spaces to correspond with the days of the week and hours and minutes of the day. The gage is attached to the way O, parallel with the plane of the type-wheels, which way may be of various forms to hold the gage and permit its adjustment. In this instance it is formed of a small cleat k, having undercut edges k' to receive or dovetail with inwardly-projecting flanges l, formed along the under surface of the flange m at the outer edge of the longer member of the gage. In said flange m are formed a series of detents or holes m', with which the stop or pin m^2 engages for locking the gage in position. Said pin is attached to a small plate-spring o, secured to the under surface of the cover and projects up through an orifice o' in the cover to enter the holes m', and to said spring is attached a small knob or thumb-piece o^2, by which the spring and stop may be depressed for shifting the gage. Along the inner edge of the longer member of the gage is formed a flange or shelf M', which supports the card at one edge when placed under the stamp, particularly when the gage is drawn out, as indicated in dotted lines in Fig. 2.

In Fig. 4 I have omitted the perforated flange m and the detent and in place thereof provided the cover with a leaf or extension P and formed upon the top of the cover and top of the extension a series of graduation-marks p, by which the gage may be set at the proper positions for properly stamping the card.

In use the gage will be set on Monday morning at the first graduation in the first hole, as shown in Fig. 1. This will be done, say, at seven o'clock in the morning. Each employé will be provided with a time-card N and on entering for work will place it in the gage

and stamp it. This impression will come at the top of Monday's space at the top of the card. At twelve o'clock the foreman will shift the gage forward one hole, so that the employés on leaving for the noon-hour may stamp their cards, and this impression will be made at the center of Monday's space. On returning to work the employés will again stamp their cards, and this impression will appear in the third place in Monday's space. At six o'clock or the shutting-down hour the foreman will again shift the gage to the fourth hole, and on leaving the employe's will each stamp their cards, and this impression will come at the bottom of Monday's space. On Tuesday morning the gage will be set in the fifth hole, and from this point the gage will be adjusted four holes for this day, the same as on Monday, and the four impressions made on each card will fill Tuesday's space.

There are four adjustments of the gage for each day in the week, so that at the close of Saturday's work each card will represent an accurate register of the exact time of employment during the week which may be readily audited.

In case the stamp-wheels should be attached to the stamp-plate the gage will be attached to a bed-plate on which the card is placed when the stamp is depressed to mark the card.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The clock mechanism, a casing for inclosing the same, a top plate to said casing, having an opening formed therein, a stamp-plate held in line with said opening, and type-wheels held in said opening within the casing and operated by said clock mechanism, in combination with an adjustable gage arranged on the top plate parallel with the type-wheels and adapted to receive a regular sequence of graduated adjustments, substantially as and for the purposes set forth.

2. The casing A of the time-stamp, provided with a way parallel with the plane of the type-wheels and a gage held by said way and formed with a series of holes or detents, in combination with a stop attached to the casing for locking the gage at its various adjustments, substantially as described.

3. The angular gage having its longer member formed with an outer and inner flange, the outer flange having a regular series of holes or detents formed thereon, substantially as and for the purposes described.

WM. HENRY MARTIN.

Witnesses:

ED. E. PHILLIPS,

ARTHUR M. THOMPSON.

(No Model.) 2 Sheets—Sheet 1.

J. D. McANLIS & H. E. FLEMING.

ELECTRIC CLOCK.

No. 485,645. Patented Nov. 8, 1892.

FIG.1.

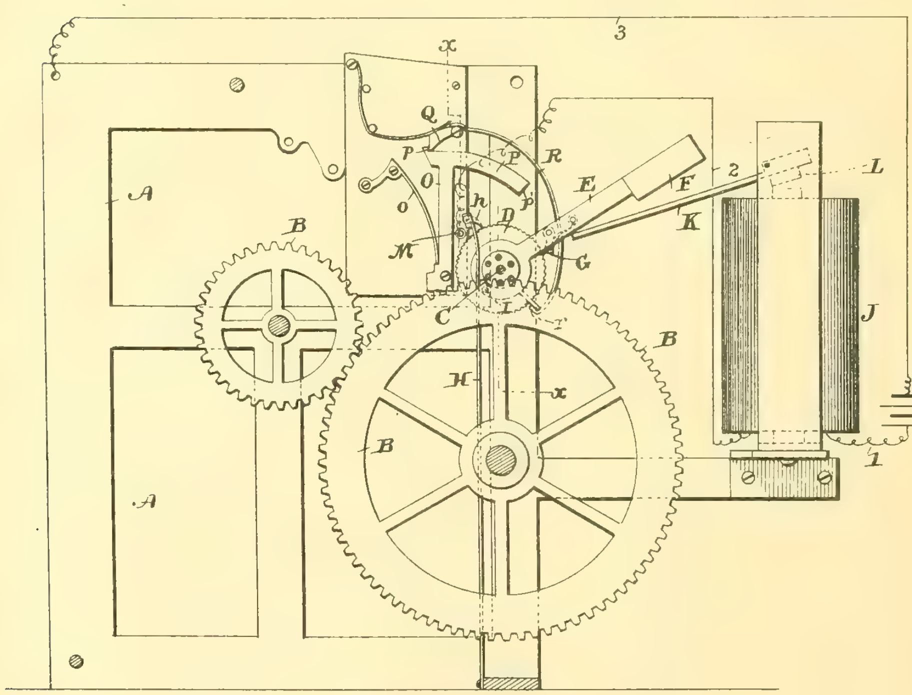


FIG.3.

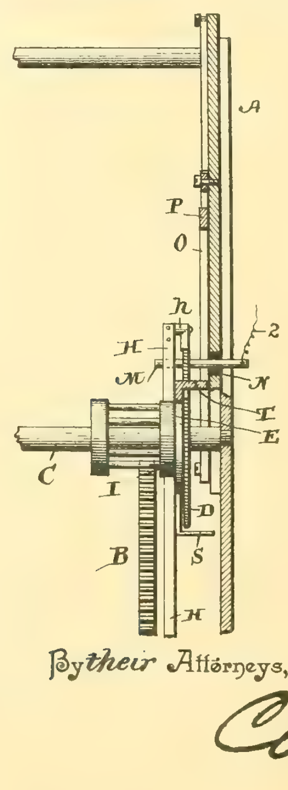
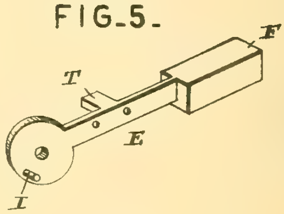


FIG.5.



Witnesses

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By their Attorneys,

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Inventors

James D. McAnlis

Harvey E. Fleming

(No Model.) 2 Sheets—Sheet 2.

J. D. McANLIS & H. E. FLEMING.

ELECTRIC CLOCK.

No. 485,645. Patented Nov. 8, 1892.

FIG. 2.

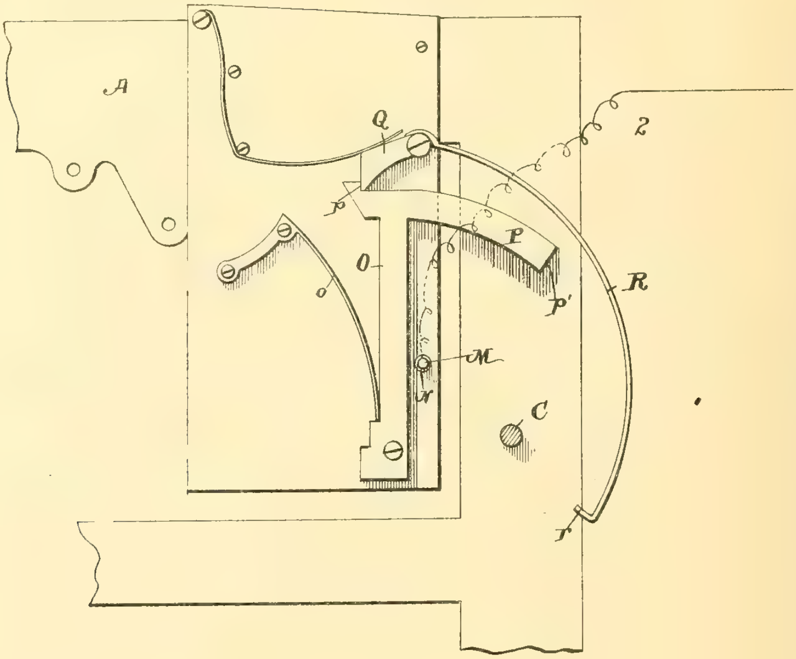
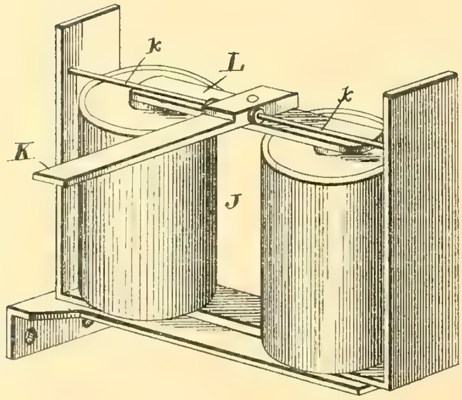


FIG. 4.



Witnesses
Jas. K. McCathran
D. P. Wolhaupter.

Inventors
James D. McAnlis
Harvey E. Fleming
By their Attorneys,
C. A. Snow & Co.

UNITED STATES PATENT OFFICE.

JAMES D. McANLIS AND HARVEY E. FLEMING, OF BEAVER FALLS, PENNSYLVANIA.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 485,645, dated November 8, 1892.

Application filed June 7, 1892. Serial No. 435,877. (No model.)

To all whom it may concern:

Be it known that we, JAMES D. McANLIS and HARVEY E. FLEMING, citizens of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Electric Clock, of which the following is a specification.

This invention relates to electric clocks; and it has for its object to provide improvements in electrically-controlled actuating devices for clock mechanism, whereby an ordinary clock is regularly operated without the use of any springs whatever, but which is accurately and continuously moved by means of electrically-controlled devices.

To this end the main and primary object of the invention is to generally improve upon and simplify the construction of electric clocks.

With these and many other objects in view, which will readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a vertical sectional view of a clock mechanism having an actuating device constructed in accordance with this invention. Fig. 2 is a similar view directly in front of the circuit-closer. Fig. 3 is a vertical sectional view on the line x x of Fig. 1. Fig. 4 is a detail in perspective of the lifting-magnet; Fig. 5, a similar view of the weight-arm.

Referring to the accompanying drawings, A represents the ordinary metallic frame of a clock mechanism, in which is mounted the ordinary train of gearing B, connected in the usual manner to turn the hands of the clock, as will be at once apparent. Upon any suitable shaft of the clock mechanism, which may be designated as C, and adjacent to one side of the frame, is fixedly mounted the ratchet-wheel D, which is designed to communicate motion to said shaft and therefore to the entire clock mechanism. Loosely mounted upon the shaft C, alongside of the ratchet-wheel D, is the swinging weight-arm E, carrying at its outer swinging end the weight F and at a point above the ratchet-wheel D a spring-actuated pawl G, which, as the weight carries the arm down, holds fast in the ratchet-wheel and carries the same therewith to move the shaft C, but which, when the arm rises, rides over said ratchet-wheel to obtain a new grip upon the same. It will be readily seen how the weighted arm pivotally mounted at one end upon the shaft C moves the shaft in its downward movement; but which, when rising, is disengaged from the ratchet-wheel. While the weight-arm is thus rising, in order to prevent any lost motion whatever I employ a motion-retaining spring H. The said retaining-spring H is fixedly secured at one end to the frame and carries at its upper end a pivoted pawl h, which of its own weight engages the top of the ratchet-wheel D. When the weight-arm E has descended to its lowest limit, an eccentrically-mounted strike-pin I, secured to the pivoted end of said weight-arm, has at this point already moved the vertical retaining-spring out of its normal vertical plane, so that as the weight-arm is raised in the manner to be described the said pin is carried away from the spring and allows the tension thereof to keep up the motion of the ratchet-wheel until the weight-arm has secured a new grip thereon. The alternate raising and lowering of the weight-arm actuates the clock. When the weight-arm has lowered to a certain point which is its limit, the electro-magnets J are brought into play to actuate the lifting-arm K. The lifting-arm K is pivotally mounted upon the rod k, mounted in the frame of the magnets directly above and a little to one side of the cores of the magnet and is connected at such end to the oscillating armature L, which by such connection is always held in very close proximity to the cores of the magnets, so that immediately upon the magnetization of the magnets the armature is quickly attracted, so as to bring the lifting-arm K up into a horizontal position. The magnets J are located at a suitable point adjacent to one end of the frame A and are so arranged that the outer end of the lifting-arm normally lies under and at the lower limit of movement of the weight-arm, so that when the lifting-arm is raised the said weight-arm is also raised to secure a new grip on the ratchet-wheel, as will be at once appar-

ent. One of the magnet-wires 1 is connected in circuit with an ordinary battery X, while the other magnet-wire 2 is connected to the circuit-closing pin M. The said circuit-closing pin M, thus connected in the battery-circuit, is passed through and insulated from the frame-plate N, secured to and therefore in circuit with the frame of the mechanism. Pivotally mounted at its lower end to said frame-plate and below the circuit-closing pin M is the spring-actuated circuit-closing arm O, which is normally pressed toward and against the circuit-closing pin by means of the spring o, bearing thereagainst, so that when the arm is against the pin the circuit is completed through the frame of the clock and the current returns to the battery through the wire 3, connected to the frame and the battery. The circuit-closing arm O is provided with an upper curved head P, having a notched shoulder p at one end and extended into a strike-arm p' at the other end. The said shoulder p is normally engaged by the spring-pressed pawl Q, pivotally mounted on the frame-plate and normally held into the shoulder, so as to hold the circuit-closing arm out of contact with the circuit-closing pin while the weight-arm is lowered. A pawl wire or arm R is connected to the securing-pawl Q, and has an outer curved operating arm or end r, which is engaged by the strike-arm S, connected to the weight-arm. The strike-arm S engages said pawl-wire when the weight-arm has reached its lower limit, so that the securing-pawl Q is lifted from the head of the circuit-closing arm and allows the said arm to be forced in contact with the circuit-closing pin to close the circuit and bring the magnets into play, as already described. As the weight-arm rises the strike-lug T, carried upon one side of the same, engages the end of the curved head P, or at least the strike-arm p', and presses the circuit-closing arm out of contact with the pin and allows the securing-pawl to again engage the notched shoulder p, as will be at once apparent.

It will be observed from the foregoing that an electric clock is provided in which a continuous and uninterrupted motion is insured and wherein the various parts of the same are certain in their movement.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In an electric clock, the combination, with a springless clock mechanism, of a ratchet-wheel fixedly secured to a shaft of the mechanism, a swinging weight-arm loosely mounted upon the same shaft and carrying a spring-actuated pawl engaging said ratchet-wheel and also having an eccentrically-disposed pin, a motion-retaining spring carrying a pawl at its upper free end normally engaging said ratchet-wheel, said spring being engaged by said pin while the weight-arm is falling, a circuit-closing device arranged adjacent to said arm and opened and closed at the upper and lower limits of movement of the same, respectively, an electro-magnet in circuit with said circuit-closer, and a lifting-arm controlled by said magnet and arranged under said weight-arm, substantially as set forth.

2. In an electric clock, the clock mechanism, a swinging weight-arm connected with and moving the mechanism and provided with a strike-arm and a strike-lug, a circuit-closing pin mounted in and insulated from the metallic frame of the mechanism, a spring-actuated circuit-closing arm mounted adjacent to said pin and provided with a notched shoulder and strike-arm engaged by said lug, a spring-actuated securing-pawl engaging said shoulder, a pawl-wire connected with said securing-pawl and engaged by the strike-arm of said weight-arm to disengage the pawl from said shoulder, an electro-magnet in circuit with said circuit-closing pin, and a lifting-arm controlled by said magnet and arranged under said weight-arm, substantially as set forth.

3. The combination, with the metallic frame, of the swinging weight-arm mounted within said frame and provided with a strike-arm and a strike-lug, a circuit-closing pin insulated from said frame, a spring-pressed circuit-closing arm mounted adjacent to said pin and provided with an upper-curved head having a notched shoulder at one end and extended into a strike-arm engaged by said strike-lug, a spring-pressed securing-pawl engaging said shoulder, a pawl-wire connected with said securing-pawl and engaged by the strike-arm of said weight-arm, and an electrically-controlled lifting device in circuit with said pin and arranged under said weight-arm, substantially as set forth.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

JAMES D. McANLIS.
HARVEY E. FLEMING.

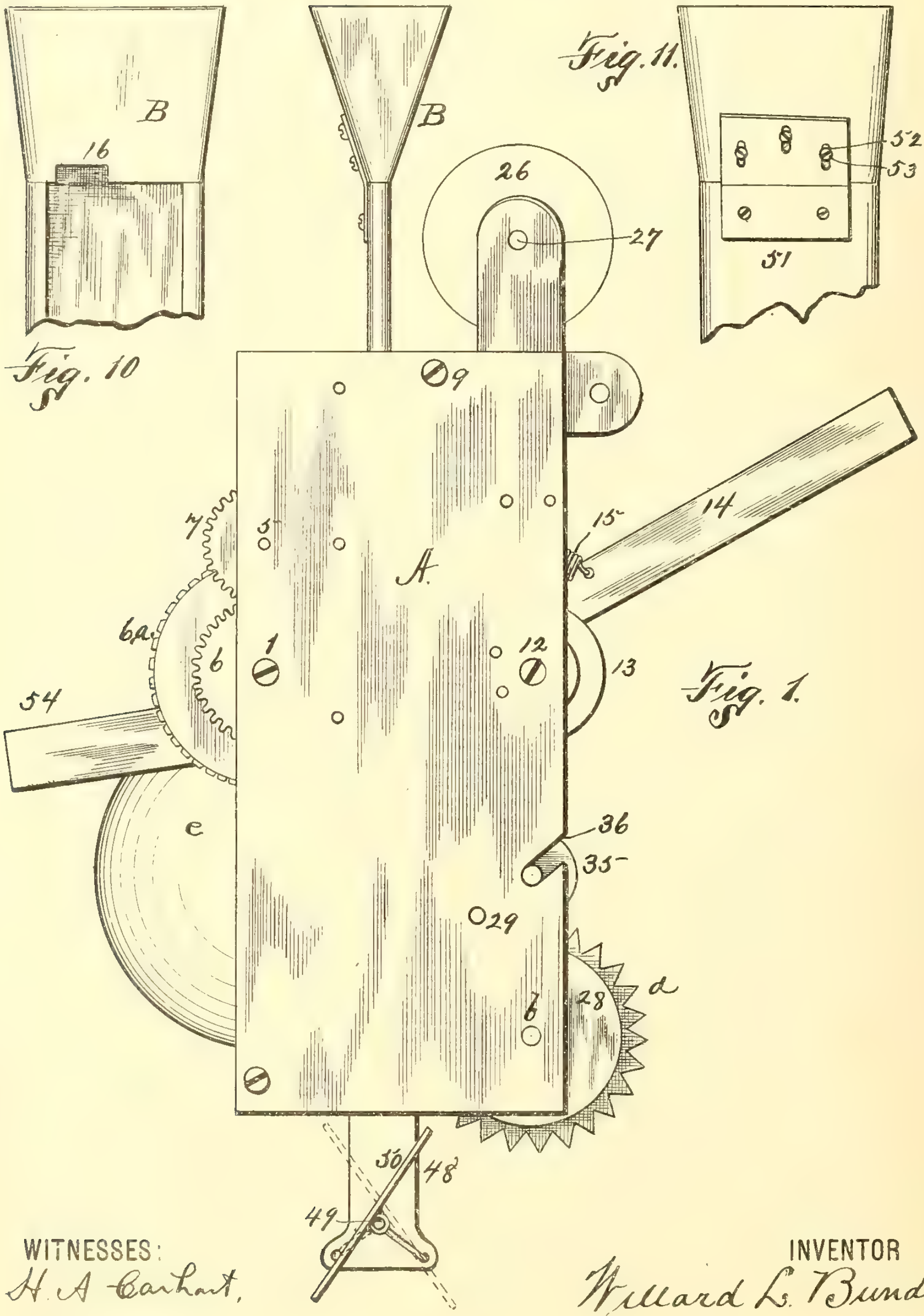
Witnesses:
JOHN M. FALLICK,
G. L. FBERHART.

(No Model.) 3 Sheets—Sheet 1.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 486,028 Patented Nov. 8, 1892.



WITNESSES:

H. A. Carhart,

C. B. Kenne

INVENTOR

Willard L. Bundy

BY

Smith & Denison

ATTORNEYS

THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

(No Model.) 3 Sheets—Sheet 2.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 486,028 Patented Nov. 8, 1892.

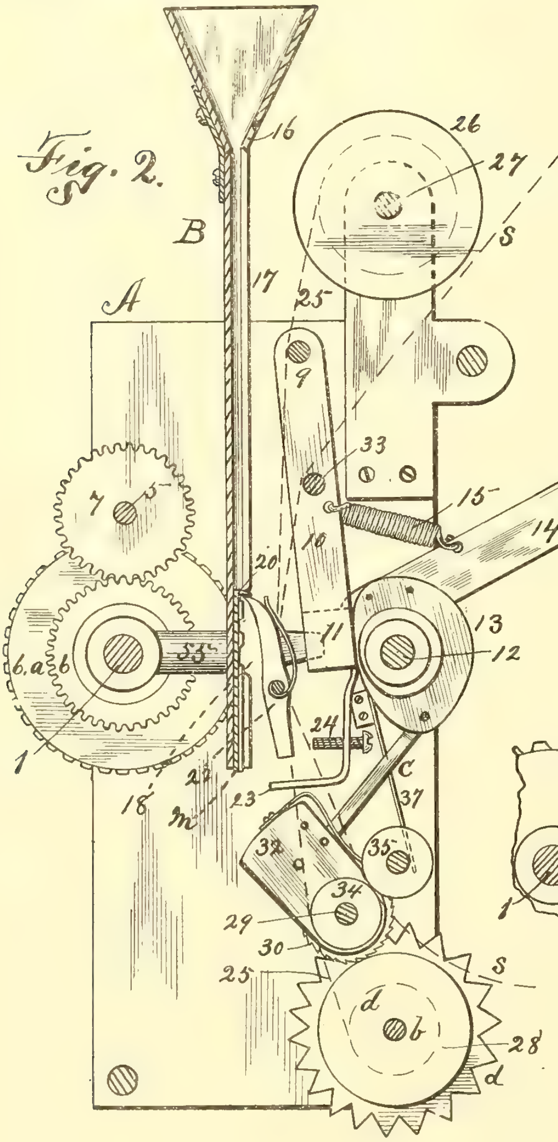


Fig. 2.

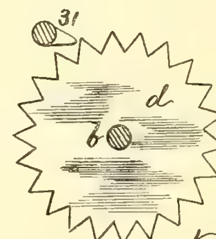


Fig. 4.

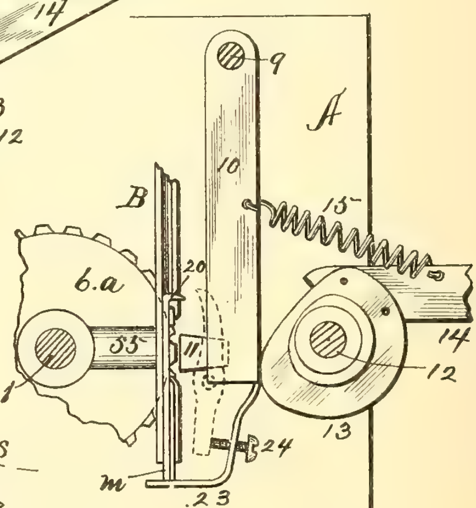


Fig. 3.

WITNESSES:
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C. B. Kinne

INVENTOR
Willard L. Bundy
BY
Smith & Denison
ATTORNEYS

(No Model.) 3 Sheets—Sheet 3.

W. L. BUNDY.

WORKMAN'S TIME RECORDER.

No. 486,028. Patented Nov. 8, 1892.

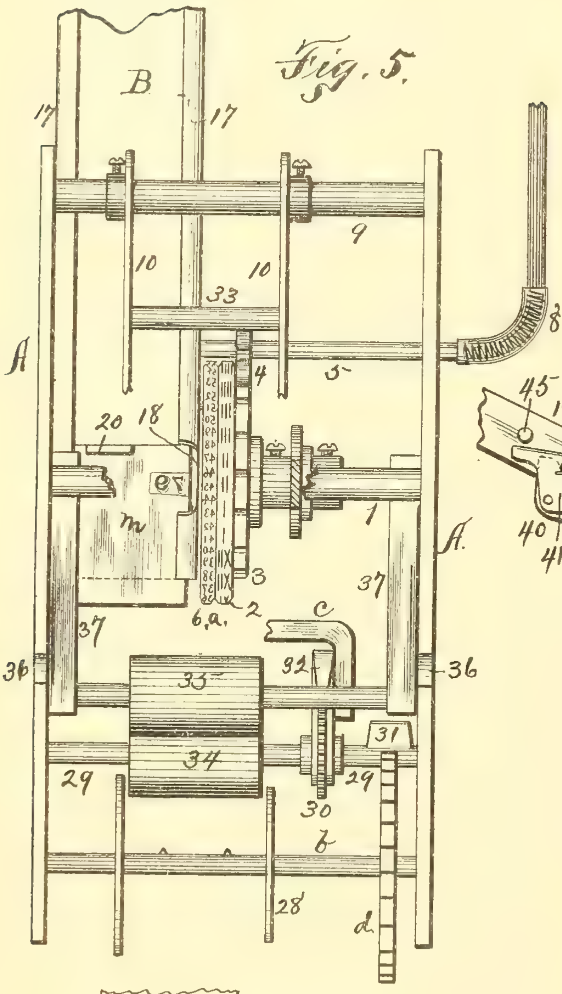


Fig. 5.

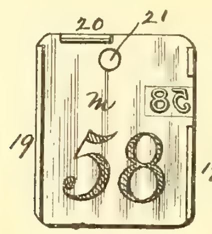


Fig. 8.

Fig. 9.

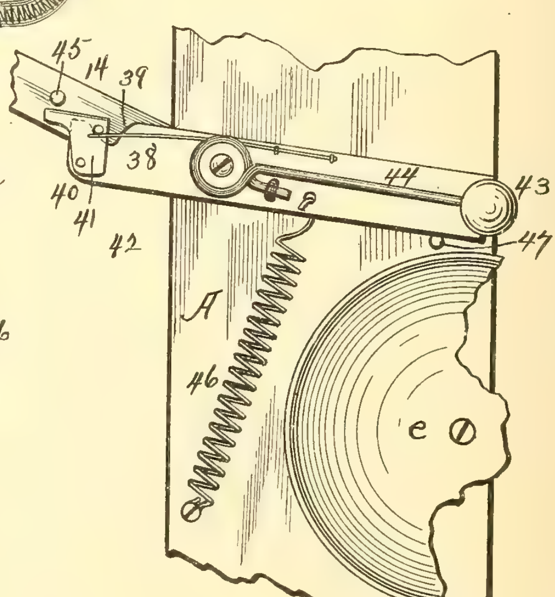


Fig. 6

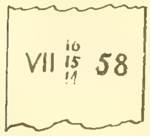


Fig. 12.

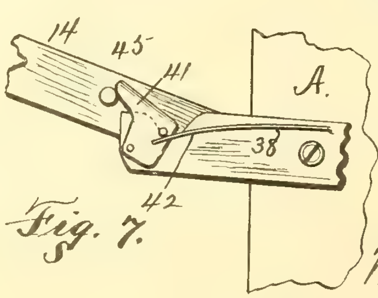


Fig. 7.

WITNESSES:

H. A. Carhart

C. B. Kinne.

INVENTOR

Willard L. Bundy

BY

Smith & Denison

ATTORNEYS

UNITED STATES PATENT OFFICE.

WILLARD L. BUNDY, OF BINGHAMTON, NEW YORK, ASSIGNOR TO THE BUNDY MANUFACTURING COMPANY.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 486,028, dated November 8, 1892.

Application filed September 10, 1891. Serial No. 405,270. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. BUNDY, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Time-Recorders, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to machines known as "workmen's time-recorders," by which each workman personally records upon a strip of paper the time when he enters or leaves a factory, or both, by means of hour and minute wheels connected to and actuated by and synchronous with a clock-movement.

My object is to produce a time-keeper in which the time-recording wheels are synchronous with the clock-movement at the printing-line, in which sheet-metal checks are used, embossed or provided with the numbers in relief, by which the workmen are respectively known, which checks are deposited in a chute, in which they are retained when the number is at the printing-line while the impression mechanism is being operated and the impression made, the imprint being made upon a paper strip through the medium of an inked ribbon, and when made indicating the number of the workman and the hour and minute when the recording imprint was made by him, and in which the impression is made by a swinging platen actuated by a cam, which in turn is actuated by a hand-lever connected to it, which lever is operated by the workman after he has dropped his check into the chute, and after each impression the check is released and dropped from the lower end of the chute into a receptacle, and which can be operated much quicker and faster than a key-operated mechanism, in which the workman must insert the key, turn it, turn it back, and then withdraw it.

My invention consists in the several novel features of construction hereinafter described, and which are specifically set forth in the claims hereunto annexed.

It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the recording mechanism. Fig. 2 is a vertical longitudinal section showing the check held in the chute ready for the impression to be made. Fig. 3 is a sectional detail of the check in the printing position and the impression block or anvil thrown in against the type. Fig. 4 is a detail of the star-wheel and the ribbon-spool shaft and the dog on said shaft, which intermittently engages with the star-wheel to rotate the spool. Fig. 5 is a side elevation, omitting part of the impression mechanism and showing the check in position, with its number upon the printing-line. Fig. 6 is a rear elevation of part of the rear of the apparatus, detailing the alarm mechanism ready to be operated by the hand-lever. Fig. 7 is a detached detail of the alarm-trip and showing it in the tilting position it assumes while the hand-lever is being returned to its normal position after an alarm has been given or impression has been made. Fig. 8 is a plan view of the working face of the check. Fig. 9 is a vertical longitudinal section of the check. Figs. 10, 11, and 12 are details of parts.

A is the main frame, comprising a front and back plate, legs by which it is supported, and stay-rods holding the plates in proper relation to each other.

Upon a shaft 1, secured in the frame-plates, I loosely mount the hour-wheel 2, provided with twelve figures on its periphery and having a twelve-toothed gear 3 on one side, which meshes with a single-toothed pinion 4, secured upon a shaft 5, journaled in the plates. Upon the shaft 1 I also mount a sixty-toothed loose gear 6, which is secured to the side of minute-wheel 6^a, provided with figures from "1" to "60" upon its periphery, and a sixty-toothed gear 7, secured upon the shaft 5, meshes with the gear 6. The flexible shaft 8, secured to the shaft 5 and connected to a clock-movement, (not shown,) rotates this shaft, and the hour and minute wheels are synchronous with the clock.

Upon bar 9, across the top of the frame, I hang the swing-frame 10, in the lower end of which I mount the impression-platen 11, the face of which is opposite the printing-line of the apparatus. Upon a bar 12, across the frame, I loosely mount the cam 13 in frictional contact with the platen 11, and 14 is a

hand-lever secured to the cam. A spring or springs 15 connect the hand-lever to the frame 10.

B is the check-chute, mounted in the frame, provided with a notch 16 in the bottom of one side of the funnel-top and having side inwardly-projecting flanges 17 below the funnel, and one of said flanges is cut away, as at 18, Fig. 5.

The check *m* consists of a piece of sheet metal having side stiffening-ribs 19, one being cut away, as shown, Fig. 8, figures secured in relief or embossed upon its face, which represent the number of the workman, and having an outwardly-projecting lug 20 on its upper edge and a hole 21, by which the check is suspended from a peg or nail upon a checkboard. This lug operates as a check-guide, so that the numbered face is always inserted in proper position into the chute-funnel, when this lug will pass through the notch 16; but when otherwise inserted the check will not drop out of the funnel. As the check falls through the chute, held therein by the side flanges 17, it is caught by the point of the spring-dog 22, engaging with the flange 20, and suspended thereby in the chute, with the figures thereon, substantially on or a little above the printing-line.

Upon the platen-frame I secure a sheet-metal angular arm 23, in which a trip 24, adjustable or rigid, is mounted, with its projecting end in such position that when the platen-frame is swung by the cam it will engage with the pawl and throw its point out of engagement with the check. At the same time this is being done the end of the arm 23 will swing over to and under the lower end of the chute, and the check will then rest upon or drop onto this arm, and while so resting thereon the number of the check will be directly in the printing-line and the platen will bear or press the paper strip (dotted line S) and the ribbon (dotted line 25) against the figures upon the time-wheels and check and make an impression of all of them across the paper strip, thus recording thereon the hour and minute and the number of the workman, as indicated by the number of the check. Then when the lever is released it will be drawn up back to its normal position and the platen-frame will be swung back to its normal position by the spring or springs connecting them.

My paper-feed mechanism is constructed and operated as follows, (see Figs. 2 and 5:) The upper or supply spool 26 is secured upon the shaft 27 upon the top of the frame, and thence the ribbon passes down, guided by the bar 9, which carries the platen-frame, past the printing-point down to the lower spool 28, which is loose upon the shaft *b*, which carries the star-wheel *d*. Upon the shaft 29 the feed-gear 30 is secured, and 31 is the feed-dog secured to and projecting from said shaft and adapted to engage with said star-wheel intermittently—that is to say, once with each full revolution of said shaft. A connecting-rod *c* is pivotally connected at one end to the cam 13 and at the other in like manner to the pawl and pawl-carrier 32, which is loosely mounted upon and carried by the shaft 29, so that whenever the hand-lever is depressed the rotation of the cam pushes the pawl down a fixed distance upon the gear 30, and then when the cam rotates back it pulls upon the pawl-carrier, and this rotates the shaft 29 and eventually brings the dog 31 into engagement with one tooth of the star-wheel, turns it the distance of one tooth, and this rotates the spool in like degree and winds onto this spool the proportionate amount of the ribbon off from the upper spool.

My paper-feed is as follows, (see Figs. 2 and 5:) A continuous strip of paper leads from an upper reel (not shown) down over the cross-bar 33 in the swing-frame, past the printing-point, behind the ribbon, and between the feed-rollers 34 and 35, and thence to any place desired. The feed-roller 34 is secured upon the shaft 29 and is rotated by the pawl-and-gear device upon the same shaft, which is actuated, as aforesaid, as a part of the paper-feed. The roller 35 is secured upon a shaft journaled removable in the notches 36 in the edge of the frame-plates and held in yieldingly frictional contact with the roller 34 or the paper upon the latter roller by springs 37, bearing upon the shaft.

My alarm mechanism is as follows, (see Figs. 6 and 7:) A hammer-carrier 38 is pivoted upon the rear of frame-plate, the outer end of which is notched, substantially as shown at 39, creating a head 40, and upon this head the tilting pawl 41 is pivoted, 42 being the spring operating to hold this pawl in its normal position, Fig. 6, and 43 being the hammer mounted upon the coiled spring 44, and *e* is the bell mounted upon the back plate. A bar 45, secured to the hand-lever, engages with pawl 40, and when this lever is depressed the outer end of the carrier 38 is depressed and the hammer raised away from the bell and a tension created upon the spring 46, and when the bar eventually slips off over the end of the pawl this spring throws the inner end of the carrier down onto the stop 47 and the concussion springs the hammer against the bell, thus sounding a single blow every time the lever is depressed. Then when the lever returns to its normal position the bar 45 engages with the under side of the point of the pawl and tilts the pawl backward until the bar passes from under it, when the spring 42 throws the pawl back into its normal position.

At the bottom of Fig. 1 I show an arm 48, from which projects a stud 49, upon which a metallic plate 50 is pivoted, which when tilted one way deflects the checks to one receptacle and when tilted the other way deflects them to another.

In Fig. 11 I show the funnel adjustable vertically upon the chute by means of the plate 51, provided with slots 52, through which the screws 53 pass, which secure the funnel to the

plate, so that by this vertical adjustment I can vary the width of the opening created by the notch 16 to enable it to pass checks provided with top flanges of varying widths.

In Fig. 2 I show a brace 55 behind the chute to support it against the pressure of the cam 13 while an impression is being made.

In Fig. 12 I show a section of the paper strip as imprinted, showing that at seven o'clock and fifteen minutes workman No. 58 registered himself.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a type-bearing check provided with a lug on one face, of a check-chute adapted to receive said lug in one of its walls and conduct the check to the printing position with proper presentation of the type.

2. The combination, with the check-chute open on one side and the check inserted therein, of the pivotal pawl engaging with said check and stopping it in the chute, and the impression-cam provided with an arm adapted to engage with the pawl and release the check when said cam is rotated.

3. The combination, with the check-chute grooved longitudinally and open on one side and the check inserted therein, having a flange upon its back entering said groove, of the pivoted pawl engaging with said flange through said opening in the chute and stopping the check in its transit through said chute.

4. The combination, with the check-chute and the check inserted therein, of the pawl stopping it in the chute and the arm catching and temporarily detaining the check when released from the pawl.

5. The combination, with the check and check-chute and the pawl catching the check in the chute, of the hour and minute wheels, the swinging platen, and the impression-cam.

6. The combination, with the check and check-chute and the pawl catching the check in the chute, of the time-wheels, the swinging platen, the impression-cam, and the arms upon the cam catching the check released from the pawl by the engagement of the arm with the pawl.

In witness whereof I have hereunto set my hand this 8th day of September, 1891.

WILLARD L. BUNDY.

In presence of—

HOWARD P. DENISON,

C. W. SMITH.

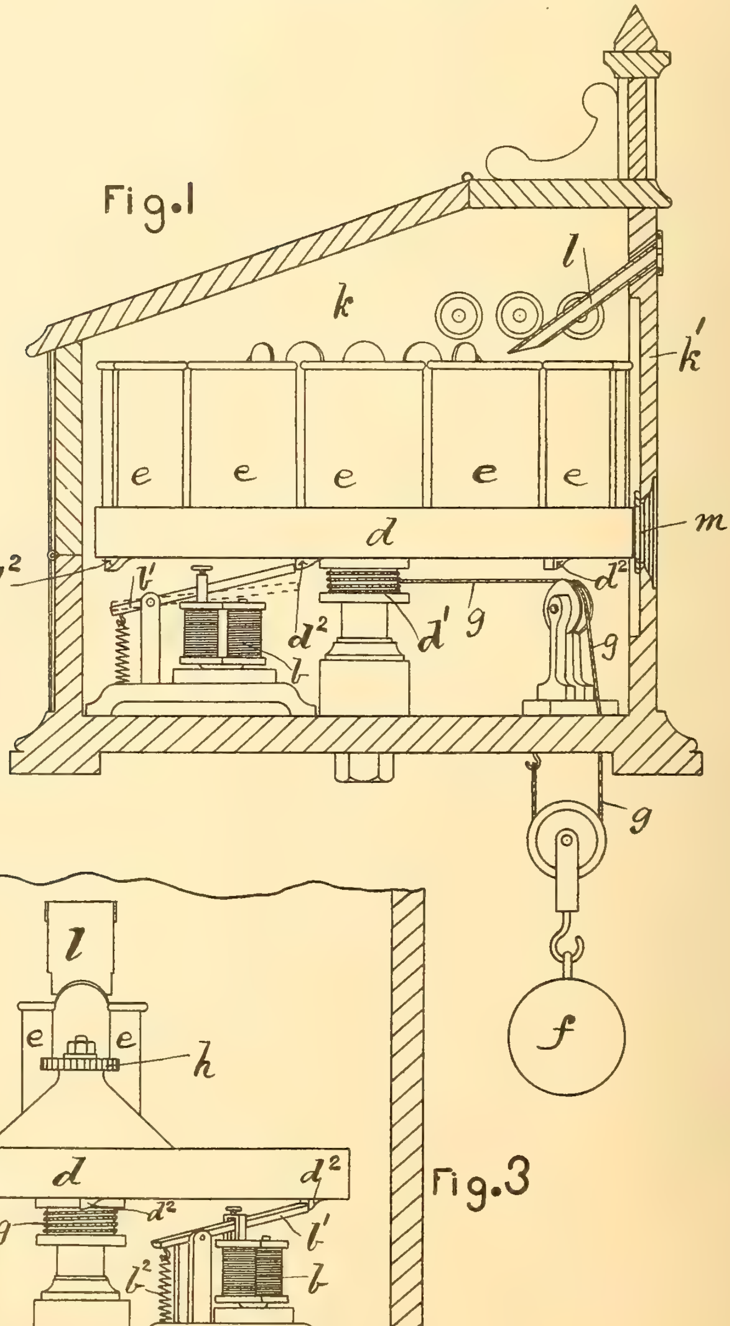
(No Model.) 3 Sheets—Sheet 1.

C. J. GARNETT & A. MOORE.

WORKMAN'S TIME REGISTER.

No. 486,399. Patented Nov. 15, 1892.

Fig.1



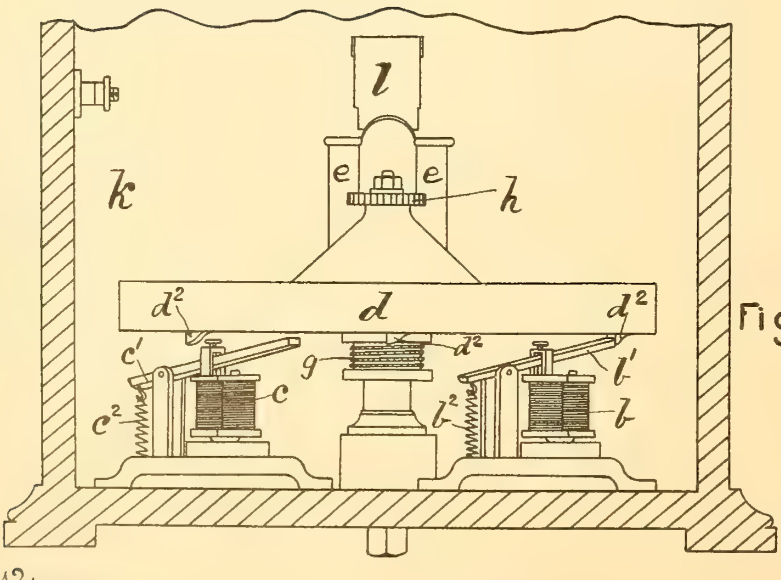


Fig.3

Witnesses
W. G. McMillan
J. A. Woodward

Inventors
Charles James Garnett
Alfred Moore
Per J. W. Horn
Attorney

(No Model.) 3 Sheets—Sheet 2.

C. J. GARNETT & A. MOORE.

WORKMAN'S TIME REGISTER.

No. 486,399. Patented Nov. 15, 1892.

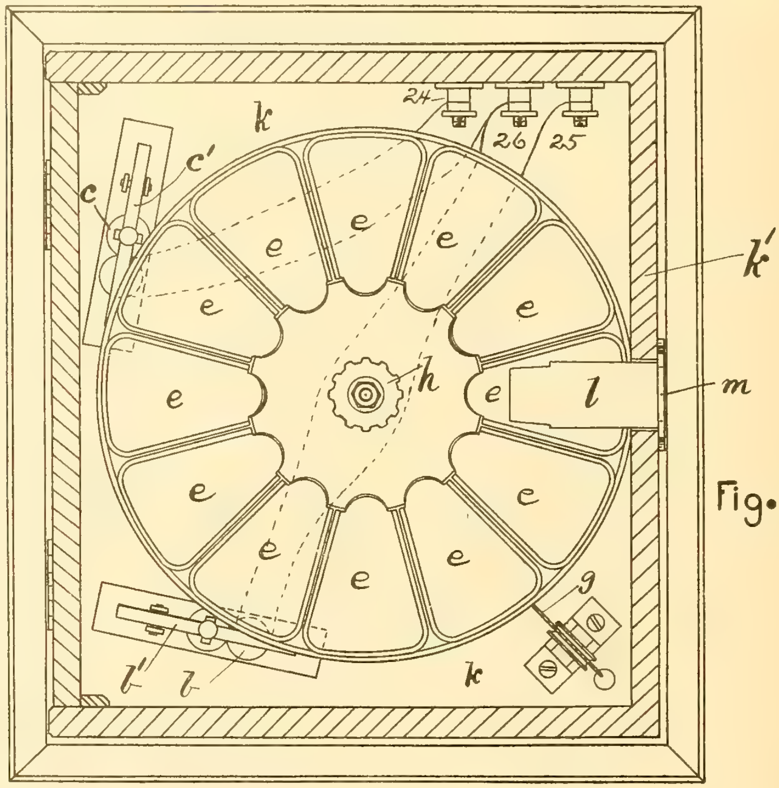


Fig. 2

Fig. 5

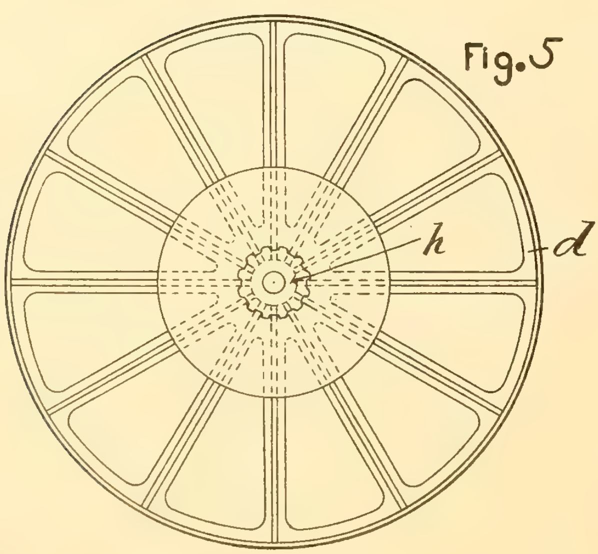


Fig. 6

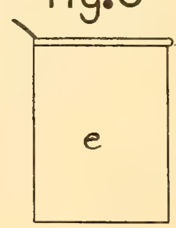
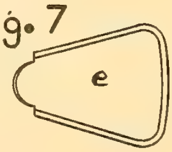


Fig. 7



Witnesses
W. G. McMillan
T. C. Woodward

Inventors
Charles James Garnett
Alfred Moore
Per T. W. Horn
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

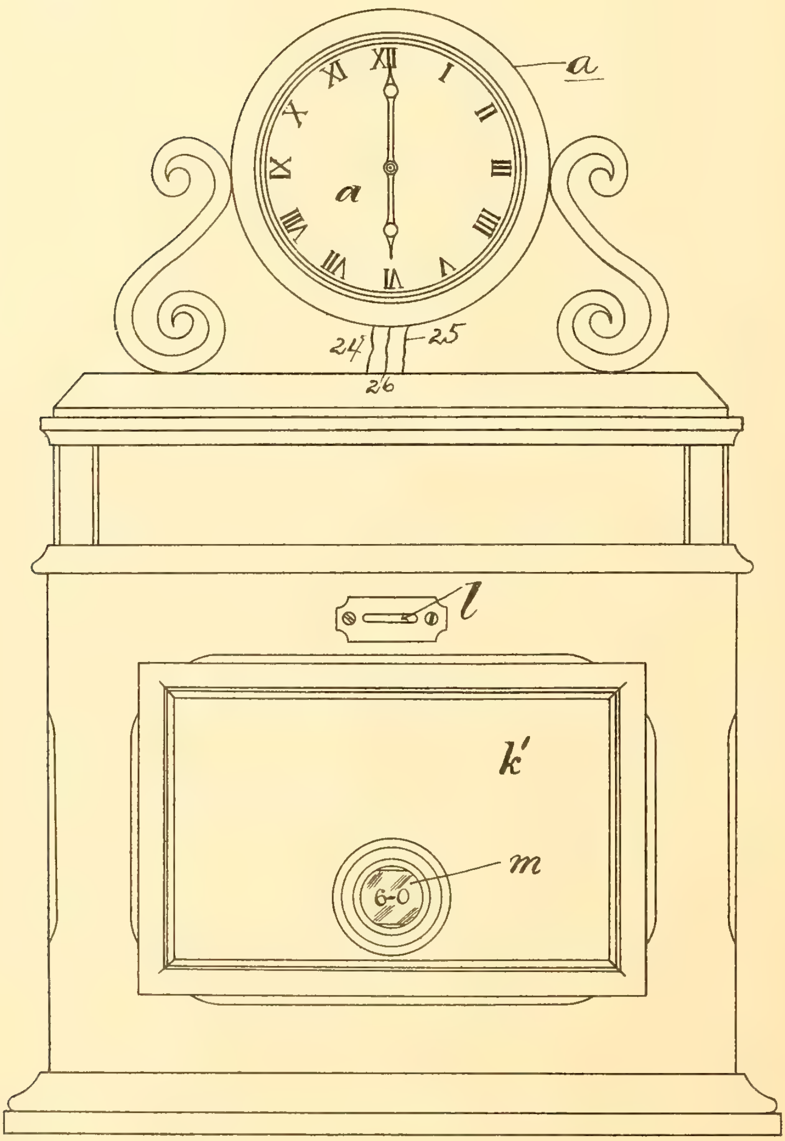
(No Model.) 3 Sheets—Sheet 3.

C. J. GARNETT & A. MOORE.

WORKMAN'S TIME REGISTER.

No. 486,399. Patented Nov. 15, 1892.

Fig.4



Witnesses
W. G. McMillan
F. A. Woodward

Inventors
Charles James Garnett
Alfred Moore
Per J. W. Horn
Attorney

UNITED STATES PATENT OFFICE.

CHARLES JAMES GARNETT AND ALFRED MOORE, OF KEIGHLEY, ENGLAND, ASSIGNORS TO THOMAS HORN, OF TORONTO, CANADA.

WORKMAN'S TIME-REGISTER.

SPECIFICATION forming part of Letters Patent No. 486,399, dated November 15, 1892.

Application filed October 20, 1891. Serial No. 409,297. (No model.)

To all whom it may concern:

Be it known that we, CHARLES JAMES GARNETT and ALFRED MOORE, subjects of the Queen of Great Britain, residing at Keighley, in the county of York, England, have invented certain new and useful Improvements in Time-Checking Mechanism, of which the following is a specification.

Our invention relates to checking mechanism for indicating the time of entrance of employés into factories, workshops, or the like; and it consists in the peculiar arrangement, construction, and combination of parts hereinafter more particularly described and then definitely claimed.

Our mechanism is so constructed that the movements thereof are controlled by the normal clock or timepiece of the shop or office, and in such a manner as to be beyond the power of the employés to tamper or in any way to interfere with the same, so as to defraud or to cause it to be inoperative.

In using our improvement each operative or employé is supplied with and represented by time-checks, usually of metal, as is well known, and we attain the object of our said invention by the employment of a series of receptacles, which represent in the aggregate the several or varied times at which said employés are allowed or expected to enter the workshop or commence their work, each one of these receptacles being presented for the reception of time-checks in its proper order, and after the expiration of each of said respective times or periods its corresponding receptacle is removed automatically, so that any checks subsequently inserted fall into the succeeding receptacle and are reckoned as of the later time.

In the accompanying drawings, Figure 1 is a side view of part of our mechanism with the case in section; Fig. 2, a plan of the same, also with the case in section. Fig. 3 is a similar view to Fig. 1, but at right angles thereto. Fig. 4 is a front view with a clock mounted on the case. Fig. 5 is a plan of the upper side of the disk and check receptacles detached. Fig. 6 is a side elevation of one of the check-receptacles. Fig. 7 is a plan of the same.

In carrying out our invention we provide a normal clock, which may be connected directly with the check apparatus, as shown in Fig. 4, or it may be separate therefrom and set in the office of the factory, as desired. In either case said clock should be connected with the coils of the electro-magnets b and c in such a manner as to cause said magnets to be alternately energized by the making and breaking of the circuits through the conducting-wires 24 and 25 and return-wire 26, running from a circuit-closer to the clock, which circuit-closer is not shown, as nothing is here claimed on it, and such circuit-closer being within the knowledge of any one skilled in the art. All that is necessary is to provide the normal clock with such a circuit-breaker as will cause the same to complete an electric circuit at any given or prearranged time, so that at each of such prearranged times one or the other of the electro-magnets b or c will, by moving its hinged armature b' or c' out of the path of motion of the projecting catches d^2 on the disk d, release the said disk d, which carries the series of detachable receptacles e (all these receptacles except one being omitted from Fig. 3) and which is constantly under the action of a motor-weight f, operating said disk d by its pull upon the cord g, encircling the drum d', attached to the disk d, and in this manner allowing the said disk d to move the space of one receptacle e at each prearranged time. In order that the rotary motion of the disk d may be arrested when the same has completed its movement of the space of one receptacle e, only half the number of projections d^2 are formed on the disk d as compared with the number of receptacles e, so that at any time said disk d is only held by one or the other of the armatures b' or c', the armature b' being shown as in contact with the projection d^2, while the armature c', although in the path of motion of the projections d^2, is the space of one receptacle from contact with the next in succession, by which means and by arranging the clock a to complete the circuits of the electro-magnets b and c, alternately, that of the electro-magnet b being next in order, when the armature b' is moved out of contact with the projection d^2 the disk d will rotate until the other projection d^2 comes in contact with the armature c'. The

armatures b' and c' are retracted by the springs b^2 and c^2, respectively, when the circuits through the magnets are broken. The cord g is rewound upon the drum d' by the turning or rotating of same by the thumb and finger wheel h.

The disk d and the receptacles e, together with the electro-magnets b and c and the other parts b', c', g, and h, are mounted within the box k, which is preferably fixed in the time-office or like private room, having only its side k' accessible to the operative. In this side k' is made a slot or opening, into and through which the operative places his time-check, which slides down the chute l into the receptacle beneath.

Now supposing that such time-check was the one used at the commencement of the working-day—say six o'clock in the morning—the particular receptacle e at that time beneath the chute l would bear figures indicating that particular time, and in order that the operative might not be misled as to the particular receptacle into which his check was falling that part of the outer edge of the disk d presented before the glazed opening m would bear the same figures and display them to him. When the time-clock a indicates the expiration of the time thus displayed, said clock also completes the circuit of one or the other of the electro-magnets, as above described, and as the armature is attracted it sinks below the stop d^2, and the disk d is moved by the weight f and cord g and another receptacle e is brought beneath the chute l and other figures are displayed at the opening m, and so the movements and operations are repeated and carried on throughout the day. If the factory is run at night-time also, the disk d should be so divided or carry such a complement of receptacles that the twelve hours during the night are divided into the same number of times, indicating the several times of starting work, as are the twelve hours of the working-day.

What we claim as new is—

1. In a time-checking mechanism, the combination of a rotary disk, check-receptacles mounted thereon, electro-magnets, armatures acted on by said magnets and engaging with the disk, and means for intermittently moving said disk at prearranged times, substantially as described.

2. In a time-checking mechanism, the combination of a rotary disk, check-receptacles mounted thereon, a motor-weight acting on said disk, electro-magnets, armatures acted on by said magnets, and a clock electrically connected with said magnets, constructed to make and break the circuits at prearranged intervals, substantially as described.

3 In time-checking mechanism, the combination of a rotary disk carrying suitably-formed receptacles, means for rotating the same, electro-magnets with hinged armatures operating in connection with projections formed on said rotary disk for governing or controlling its said rotary motions, and a timepiece or clock for completing the circuit of said electro-magnets at prearranged times, substantially as specified.

CHARLES JAMES GARNETT.
ALFRED MOORE.

Witnesses:
JOHN WHITEHEAD,
HARRY ELLISON.

(No Model.)

6 Sheets—Sheet 1.

J. GANSS.

TIME STAMP.

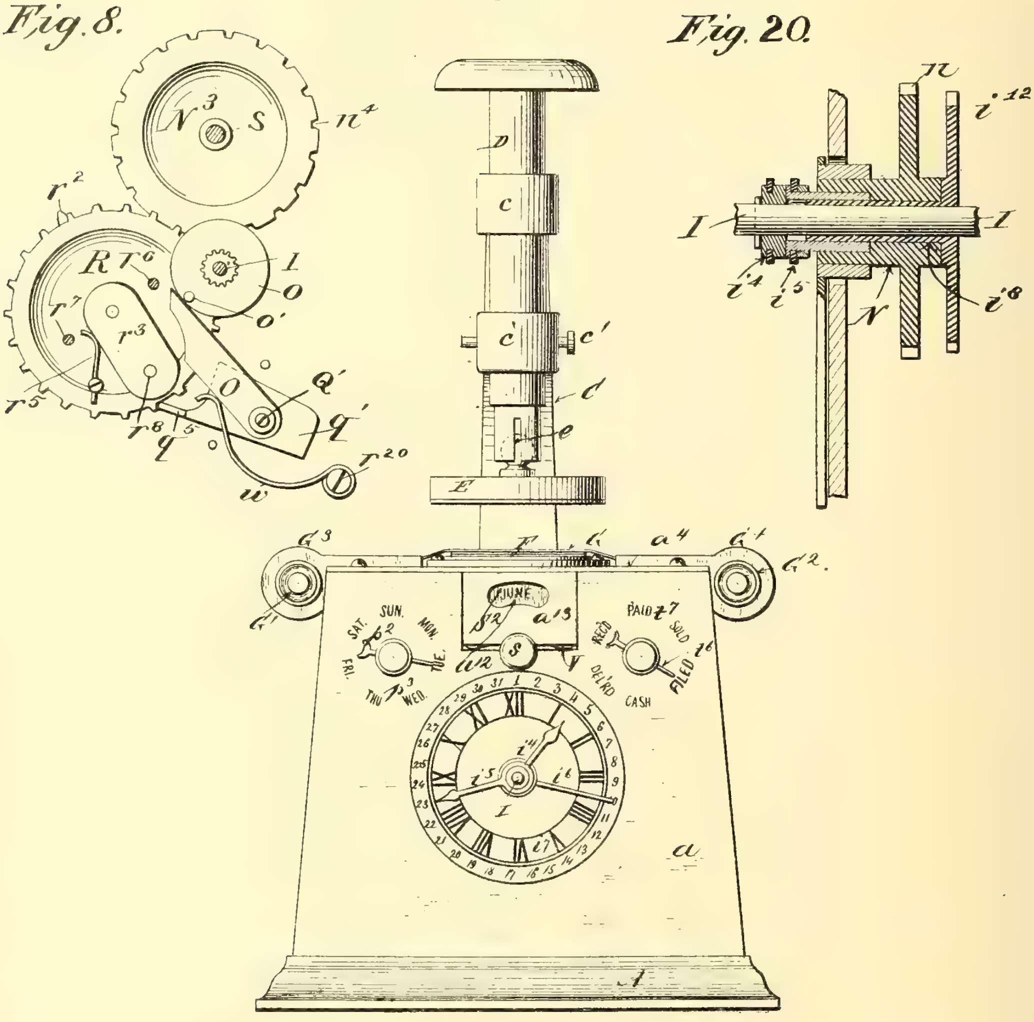
No. 486,458.

Patented Nov. 22, 1892.

Fig. 1.

Fig. 8.

Fig. 20.



Witnesses:

D. W. Gardner

H. W. Pollock

Inventor:

Jacob Ganss

By his Attorney

Geo. H. Hiatt

(No Model.) 6 Sheets—Sheet 2.

J. GANSS.

TIME STAMP.

No. 486,458. Patented Nov. 22, 1892.

Fig. 2.

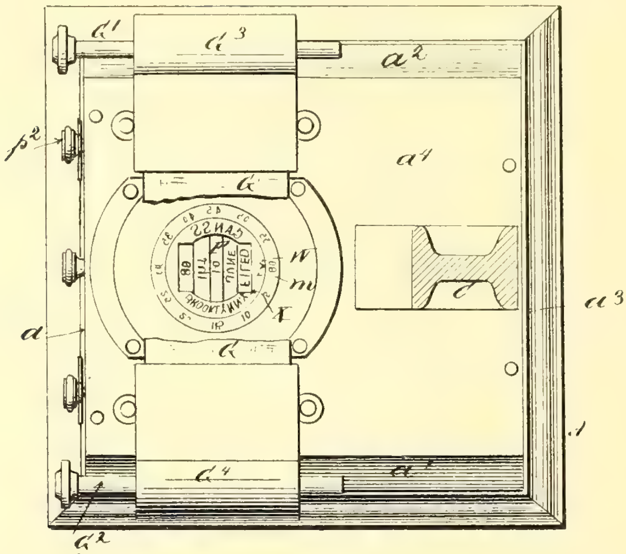
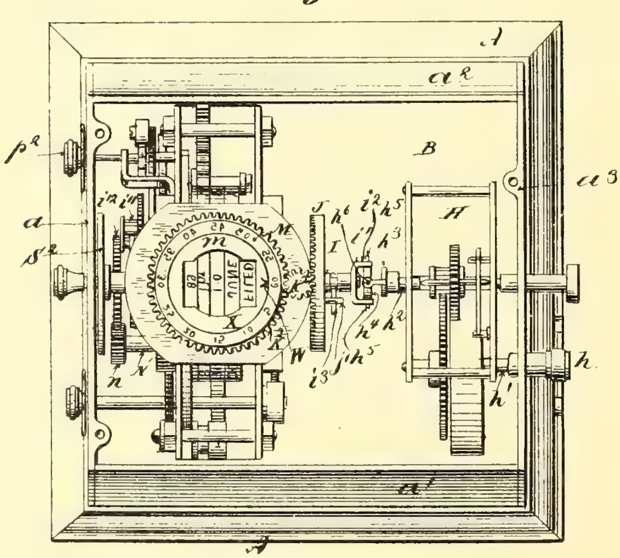


Fig. 3.



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By his Attorney
Geo. W. Miatt

(No Model.)

6 Sheets—Sheet 3.

J. GANSS.

TIME STAMP.

No. 486,458.

Patented Nov. 22, 1892.

Fig. 4.

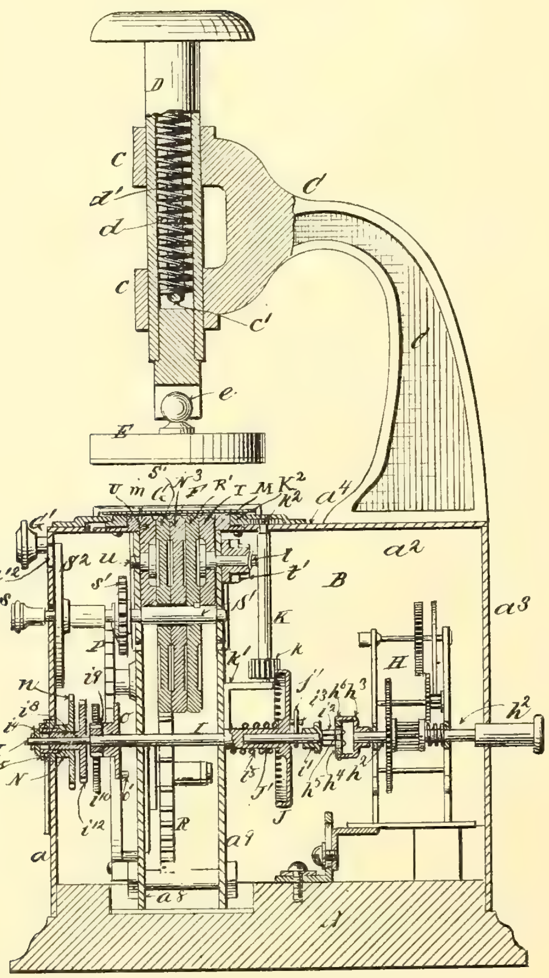
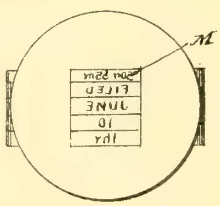


Fig. 5.



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(No Model.) 6 Sheets—Sheet 4.

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TIME STAMP.

No. 486,458. Patented Nov. 22, 1892.

Fig. 7

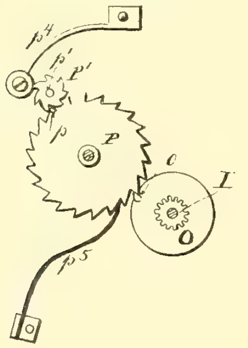
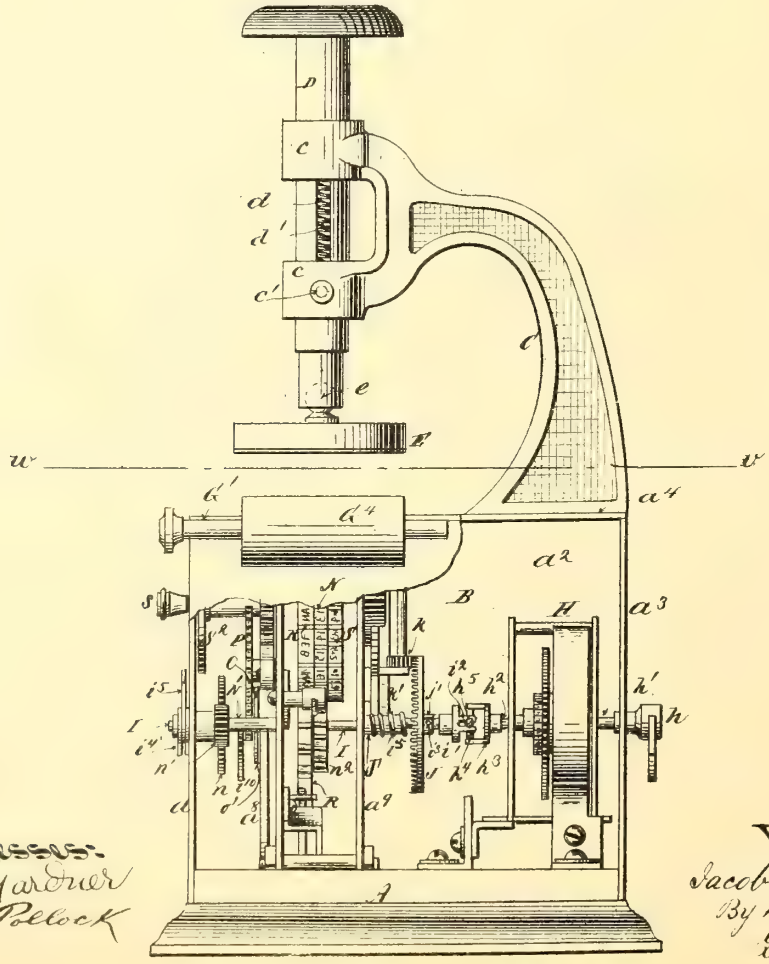


Fig. 6.



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6 Sheets—Sheet 5.

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Fig. 9.

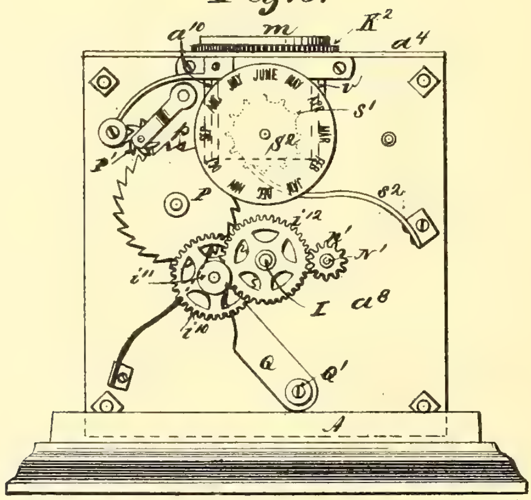


Fig. 13.

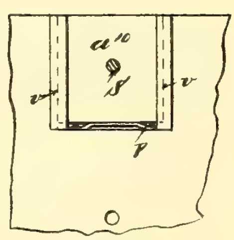


Fig. 12.

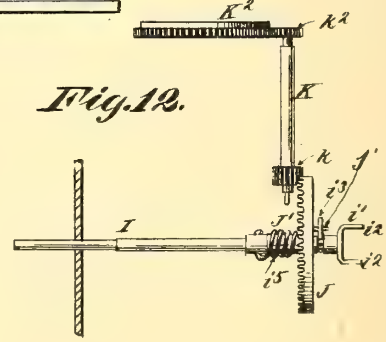


Fig. 11.

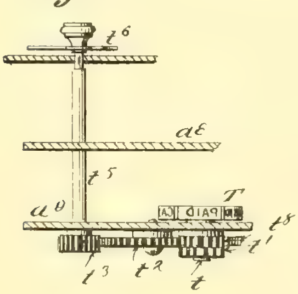
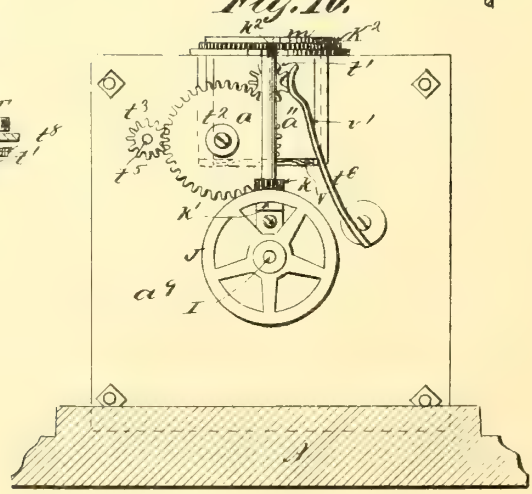


Fig. 10.



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6 Sheets—Sheet 6.

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TIME STAMP.

No. 486,458.

Patented Nov. 22, 1892.

Fig.14.

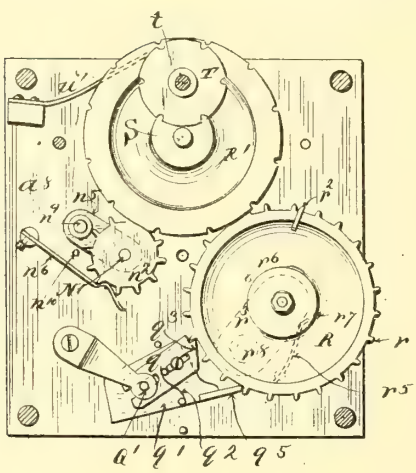


Fig.15.

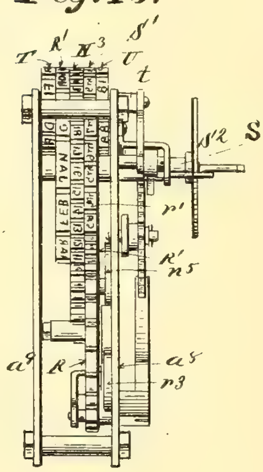


Fig.19.

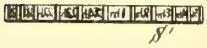


Fig.16.

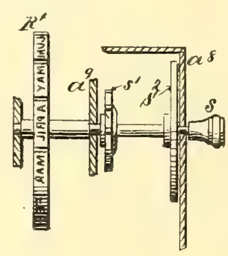


Fig.18.

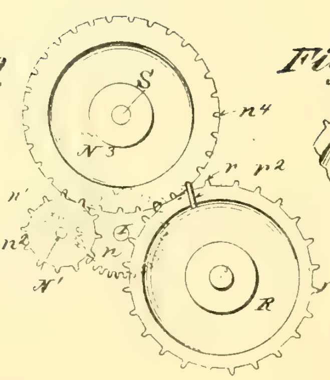
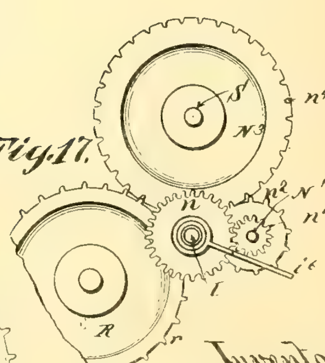


Fig.17.



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UNITED STATES PATENT OFFICE.

JACOB GANSS, OF BROOKLYN, NEW YORK.

TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 486,458, dated November 22, 1892.

Application filed June 27, 1889. Serial No. 315,794. (No model.)

To all whom it may concern:

Be it known that I, JACOB GANSS, a citizen of the United States, and a resident of the city of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Time-Stamps, so called, of which the following is a specification.

The object of my invention is to simplify the mechanism of time-stamps and to provide movements and arrangements of the parts whereby greater compactness, accuracy, regularity, durability, and economy may be secured. I attain these objects by the use of the mechanism hereinafter described, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of a time-stamp containing my improvements. Fig. 2 is a horizontal section upon plane of line w v, Fig. 6, the inking-ribbon being broken away. Fig. 3 is a plan of the parts within the casing. Fig. 4 is a central vertical section showing certain parts in elevation. Fig. 5 is a plan view of modified arrangement of the printing-types. Fig. 6 is a side elevation, one of the side plates being broken away. Fig. 7 is a detail view of parts connected with index designating day of the week. Fig 8 is a detail view of portion of mechanism for changing hour-printing wheel. Fig. 9 is a front elevation of the interior supporting-frame, &c., outer casing being removed. Fig. 10 is a rear elevation of Fig. 9. Fig. 11 is a detail view of the canceling or descriptive printing-wheel and its index and intermediate connections. Fig. 12 is a detail of minute-printing wheel and actuating mechanism. Fig. 13 is a detail of my movable box-plate carrying shaft of printing-wheels. Fig. 14 is an elevation of back side of front plate. Fig. 15 is a side elevation of interior supporting-frame removed from the casing. Fig. 16 is a detail of index and wheel and connections for printing and indicating day of month. Fig. 17 is a detail front view of mechanism for printing day of month. Fig. 18 is a rear view of Fig. 17. Fig. 19 is an edge view of hour-printing wheel, illustrating numbering hours from "1" to "24," consecutively. Fig. 20 is a detail view, on a larger scale in section, of certain of the parts shown at the left in Fig. 4—to wit., i^4 i^5 i^6—and of the parts by means of which they are driven.

A is a base supporting the mechanism, and a a' a^2 a^3 a^4 are casing-plates.

C is a standard supporting an ordinary vertical spring-plunger D, connected, preferably, by ball-and-socket joints e with a platen E.

G is an ordinary inking-ribbon interposed between type-bed F and the platen E, wound upon spindles G' G^2, passing through ribbon-boxes G^3 G^4, all these parts being operated in the usual manner.

An ordinary clock-movement H (non-essential parts being omitted in the drawings) regulates the mechanism, the motive power being furnished by springs in the usual manner; but any other convenient motive power might be employed.

h^2 is the main shaft of the clockwork and is coupled to one end of the driving-shaft I by my improved coupling, which consists, essentially, in providing one shaft with radially-projecting pins h^5 h^5 and the other with bifurcated arms i^2 i^2, between each of which one of the radial pins project, and, if preferred, as shown in the drawings, a bifurcated end piece h^3 may be attached to one shaft, between the arms of which is pivoted a disk or ring h^4, upon which may be carried the said pins h^5 h^5. Any other form of coupling adapted to yield in any direction might be used.

J is a crown-wheel sleeved upon shaft I and connected therewith by a spring i^5. A pin j' on wheel J is normally held in engagement against a radial arm i^6 on shaft I by pressure of said spring i^5. Should the rotation of wheel J be arrested shaft I will thus continue to revolve, and on release of wheel J spring i^5 will return it to normal position relative to the shaft.

Wheel J has seventy teeth engaging with pinion k, having fourteen teeth on lower end of shaft K, suitably supported, on upper end of which is pinion k^2, having twelve teeth meshing with sixty teeth upon periphery of minute dial-wheel K^2, bearing types indicating the sixty minutes, which is thus caused to rotate once in each hour simultaneously with driving-shaft I. K^2 and its connections are shown separated from the rest of the apparatus in Fig. 12 of the drawings. Dial-wheel K^2 is supported and revolves upon the top

plate a^4, and is centralized against lateral displacement by open circular shoulder or box m, around which it rotates.

To the outer end of the driving-shaft I is mounted the minute hand i^5. Sleeved thereon in the usual manner are the hour-hand i^4 and the calendar-index i^6, all acting in conjunction with the dial i^7 on front plate a.

Hour-hand is mounted upon sleeve i^8, which is rotated upon the shaft I by pinion i^9, rigidly attached upon latter and acting through intermediate gear and pinion i^{10} i^{11} upon gear-teeth i^{12}, upon said minute-hand sleeve. Day-index i^6 is fixed to outer end of sleeve N, which in turn surrounds sleeve i^8 and is moved once in twenty-four hours by engagement of its spur-wheel n with pinion n' on forward end of counter-shaft N′, on rear of which is pinion n^2, actuated by day-printing wheel N^3, the teeth of the pinion N^3 being so arranged that pinion n^2 is advanced a single tooth for each movement of the day-printing wheel.

By a disk O, attached to shaft I, are carried two lateral projections o o'. Projection o at each rotation of shaft I engages with one of the twenty-four ratchet-teeth upon an intermediate wheel P. The intermediate wheel P also carries a projecting pin p, which at each revolution of P moves index-wheel P′ one tooth. Thus P′ being provided with seven teeth, index p^2, attached to outer end of shaft p', will be moved forward once at each revolution of P or every twenty-four revolutions of I, and thus once in every twenty-four hours, whereby said index p^2 is caused to point successively to the names of the different days of the week on outer dial p^3.

Fig. 7 represents a detail view of the parts referred to in the act of changing. P P′ are held against disarrangement by spring-detents p^4 p^5. The other projection o' at each revolution of disk O engages against tripping lever-arm Q and depresses it against the stress of spring w', secured to inner plate at r^{20}. Q is attached to front end of rock-shaft Q′, on inner end of which sliding pawl q is arranged to engage with a tooth of motor-wheel R at each reciprocation of Q′. Various pawl devices might be used; but I prefer that which is illustrated in the drawings, particularly at Fig. 14. On arm q', which is attached to the inner end of rock-shaft Q′, I mount a movable piece q. The rock-shaft Q′ and also a pin secured to arm q' pass through longitudinal slots in this sliding piece or pawl, which thus lies between the arm q' and the bracket in which turns the rock-shaft. The sliding pawl is provided with an inclined or beveled edge q^3 and is held constantly in contact with the motor-wheel R by means of a spring q^2. At each depression of the arm q', caused by the tripping-lever Q actuating the rock-shaft Q′, the inclined or beveled edge q^3 is brought into contact with one of the teeth of the motor-wheel R, and thus the sliding pawl q is caused to slide backward the distance that one of said teeth projects from the said motor-wheel, and on passing the tooth is released from its pressure and projected forward by the spring q^2, so as to make a firm engagement with the tooth, which it then carries forward as the arm q' moves upward on the tripping-lever Q being released from the pressure of the projection o and restored to normal position by the stress of the spring w'. The arm q' is also provided with a rigid projection q^5, which prevents the escape of more than one tooth of the motor-wheel R at each vibration of the tripping-lever Q. It is of course evident that without departing from my invention any equivalent of the spring q^2 might be employed—as, for instance, the position of the parts might be changed so as to apply them to the upper instead, of as at present, to the lower portion of the motor-wheel R—whereby gravity, instead of said spring q^2, might be employed to effect the return slide of the pawl into engagement with the tooth of the said motor-wheel. The periphery of the motor-wheel R is provided with twenty-four equidistant projecting teeth, which engage twenty-four corresponding nicks n^4 in periphery of hour-printing wheel S′, and which nicks in this case are situated between types designating the twenty-four hours of the day. The hour-wheel S′, is supported by and turns freely upon shaft S, and is thus advanced one notch at each revolution of main-shaft I, whereby the type designating the proper hour will be at the right time brought into position for printing.

In the mechanism shown I have designated the hours consecutively from "1" to "24;" but it is obvious that the conventional method of indicating the hours, as of "a. m." or "p. m.," might be employed, it being only necessary to cut the type-faces accordingly.

Fig. 8 shows a detail view of the hour-printing-wheel mechanism.

Fig. 18 and 19 illustrate the connection of the motor-wheel R with the day-printing wheel, and through the latter with the day index in the front of the apparatus. The motor-wheel R carries a single tooth or projection r^2, Fig. 19, upon its side in line with the day wheel N^3. Projection r^2 engages with one of the notches n^4, Fig. 8, at each revolution of the motor-wheel R, thereby advancing wheel n^3 one notch and bringing the type representing a new day of the month into position for printing-wheel N^8, being also free to rotate upon shaft S. This rotation of day-wheel N^3 operates to change the position of pointer i^6 with relation to dial i^7 through the gears n n' n^2, as will be readily understood.

The motor-wheel R is mounted upon an arm r^3, Fig. 8, which is by the pivot r^8 secured to the frame-plate a^8, which latter is not shown in the drawings. The arm r^3 is thus provided with a bearing fixed to the frame-plate, while the other end of the arm r^3 is free to vibrate, carrying with it the motor-wheel R, the extent of this vibration being limited by stops r^6 r^7, which are also fixed to the frame-plate, and which, like the pivot r^8, are in Fig.

S shown in cross-section, the drawings representing the frame-plate a^8 as being cut away and removed, and it being understood that the stops r^6 r^7 and the pivot r^9 are not attached to motor-wheel R. The motor-wheel R, thus mounted upon and supported by the vibrating arm r^3, is pressed into engagement with the printing-wheel N^3 by the spring r^5. The toothed gear-wheel n^2, Figs. 18 and 19, is similarly mounted upon a vibrating arm n^5, Fig. 14, pivoted at one of its extremities to the frame-plate a^8 by pivot n^9. The extent of vibration of the arm n^5 is also limited by the stop n^{10}, and the toothed gear-wheel n^2 is pressed into engagement with the day-printing wheel N^3 by the spring n^6. By thus mounting the wheels upon movable bearings adapted to yield while the teeth are approaching, passing across, and leaving a line drawn between the center of such wheel and the center of the wheel N^3, bearing notches n^4 in which the teeth of said wheels engage, it is possible to greatly reduce the size of the notches and of the teeth as compared to ordinary gearing. The action of the wheels is also eased. The wheels are substantially locked between movements, the teeth bearing upon the notches substantially only while crossing the line between the centers of the toothed wheels and the wheel N^3, and the printing-wheel N^3 is caused to spring forward periodically in its rotation during the brief period in which the center line is crossed by the teeth, as aforesaid. Thus the printing-wheel rotates step by step, and each type is in turn brought by a quick forward movement into the required position for printing where it remains until the next movement occurs.

The notches n^4 of the wheel N^3, as well as the similar notches of the wheel R, are of less depth than the teeth r of the wheel R, and then the teeth of the wheel n^2, whereby the peripheries of the wheels R and n^2 are kept from actual contact with the peripheral printing-types. It is thus possible to reduce the size of printing-wheels to that absolutely required by the printing-characters and their proper intervals of separation, whereas in former systems of gearing wheels together the space required for the notches necessarily consumed about half of the peripheral surface, which by my method is available for the types. It is also noticeable that my method dispenses with intermediate chains of gearing, and my apparatus is rendered more durable, less liable to derangement, and much smaller and more compact.

Shaft S, rotating in bearings in the two frame-plates a^8 a^9, as well as in the front plate a, through which it extends, supports the hour-wheel S′ and the day-wheel N^3, which are loose and rotate thereon, and the month-wheel R′, fixed thereto and rotating therewith, and is provided with a knob s to facilitate rotation from exterior. On shaft S is secured month-index disk S^2, carrying names of the months in position and order arranged to coincide with the corresponding types on periphery of month-printing wheel R′. Through a slot a^{12} in front plate a (see Figs. 1 and 4) a portion of disk S^2 is exposed, thus providing index of position of month-printing wheel. R′ and S^2 may be steadied against accidental movement in any convenient manner—as, for instance, by a spring mounted on frame-plate a^8, and so placed that the free end shall press against the sprocket-wheel s' on shaft S.

Printing-wheel T is supported upon shaft t, projecting from frame-plate a^9. Its periphery may be provided with types to print any desired word, such as "paid" "filed." It is connected with small pinion t', meshing with intermediate spur-wheel t' and engaging with pinion t^3 upon end of shaft t^5, to outer end of which pointer t^6, Fig. 11, is attached, so adjusted relatively to the said types that when turned into coincidence with one of the words upon outer dial t^7 that word will be presented in position for printing upon T. Spring-detent t^8, bearing on pinion t, prevents accidental movement of wheel T and connections. The year-wheel U is also mounted independently upon stud u, projecting from frame-plate a^8, is held against accidental displacement by a spring-detent u', has no connection with the remaining mechanism, and is turned by hand when necessary to change the year.

To facilitate withdrawal of printing-wheels, it is preferable to make removable sections a^{10} a^{11} a^{13}, sliding in grooves v v in frame-plates a^8 a^9 and front plate a, as shown in Figs. 1, 10, and 13. It is also preferable, to diminish strain and jar, that these sliding sections should be supported upon springs V V.

The operation of the mechanism will be readily understood from the foregoing description.

The various printing-surfaces are preliminarily arranged in the required position by suitably turning their aforesaid respectively-connected indexes, pointers, handles, &c., all from the exterior of the casing. Motive power is then applied to turn the shaft I once in each hour. The hour, minute, and day printing dials may then be automatically rotated by the mechanism and in the manner described, so as to print a correct record of the time. At the commencement of each year and month the corresponding printing-dials must be set in the required position by hand. The minute and fraction of a minute is indicated in the print by the relation of the minute-types on rotating dial K^2 relatively to fixed index W. If preferred, the printing-platen may be cut away or diminished in size, so as to cover and accordingly print only a few of the minute-type marks in the vicinity of the index-pointer.

The following advantages result from the use of the mechanism described. The movements of the printing-wheels and of their corresponding exterior indexes being synchronous, the matter to be printed may be readily determined. Again, danger of injury to the

apparatus from jar is diminished by flexible coupling between shafts and also by spring-cushioning. Again, the combination of horizontally-rotating printing-dial with vertical rotating peripherally-typed printing-wheels, projecting so as to print within said dial, permits independent trains of gearing to produce required movements without interference and compacts the types and facilitates their automatic change. Again, by the use of the mechanism described, an independent train of gearing for each vertical peripherally-typed printing-wheel is dispensed with. The type-wheels are independently supported directly upon an axis around which they freely revolve. The wheels are independently actuated, and sleeving of them over each other or other connections between them are dispensed with. Again, the movement of the minute dial is continuous, and the apparatus therefore accurately prints fractions of a minute. On the other hand, the remaining type-wheels move intermittently only at proper periods and intermediately present constantly without motion the required type for printing.

Some of the advantages incident to the peculiar method of engaging the motor-wheel with the vertical type-printing wheels have already been described; but the engagement of the teeth of the motor-wheel in the notches of the printing-wheel by means of spring-pressure is also particularly advantageous, in that by properly spacing the said teeth and notches relative to the printed matter, as will be readily understood, the printing-wheel is prevented from resting in any position except one in which the types thereon shall be flatly and squarely presented to the platen. A rotary impulse having been imparted to the printing-wheel through the motor-wheel, the movement will continue until the particular tooth on the motor-wheel, which for the time being produces the rotation of the type-wheel, has passed the center-line between the two wheels and has come to rest upon the other side of such line. Again, the special pawl and sliding click mechanism described provides engagement with the teeth of the motor-wheel, which, while readily yielding and passing over the teeth when moved in one direction, when moved in the opposite direction presents an entirely rigid engaging surface bearing against and to actuate the teeth on the motor-wheel. Again, the vertical printing-wheels, being independently supported on their shaft, admit of movement backward and forward to a limited extent without derangement of the other portions of the mechanism, and thus, together with the remainder of the mechanism, are further insured against injury from the jar caused by the descent of the platen in printing. Again, the special form of joint or engagement device used between the two main shafts, while of unusually simple construction and affording a close and perfect union, admits of displacement to a very considerable extent without loss of union or contact.

What I claim as new, and desire to secure by Letters Patent, is the following, viz:

1. In a time-stamp, a type-bearing ring-shaped printing-dial rotating in one plane and in combination with such dial and projecting within the same, and a peripherally-typed wheel rotating in another plane substantially at right angles to the first, substantially as and for the purpose described.

2. The annular rotatable dial K^2 and the stationary central circular box m, formed with an aperture for the exposure of the peripheries of the printing-wheels underneath, in combination with said peripheral-printing wheels, substantially as and for the purpose described.

3. The combination of the peripherally-typed wheel N^3, rotating printing-dial wheel K^2, teeth upon said dial-wheel, stationary central box-bearing m, having aperture for the exposure of said peripherally-typed wheel, pinion k^2, meshing with teeth of K^2, pinion k, and crown-wheel J, attached to driving-shaft I, substantially in the manner and for the purpose specified.

4. The combination of a geared rotating printing-dial wheel K^2, a stationary central box-bearing m, having aperture for the exposure of peripherally-typed wheels underneath, pinion k^2, meshing with gears of K^2, shaft K, pinion k, sleeved crown-wheel J, projections i^3 j', spring i^5, and shaft I, substantially in the manner and for the purpose specified.

5. In a time-stamp substantially such as described, a rotatory printing-wheel, the periphery of which is provided with printing-types and with intervening notches, in combination with a rotating toothed actuating-wheel mounted upon a yielding support, substantially as and for the purpose described.

6. In a time-stamp substantially such as described, a rotatory printing-wheel having its periphery provided with printing-types and intervening notches, in combination with a correspondingly-toothed rotating actuating-wheel having a yielding bearing and maintained in operative contact with said printing-wheel by spring-pressure, substantially in the manner and for the purpose described.

7. In a time-stamp substantially such as described, a rotatory printing-wheel having its periphery provided with printing-types and intervening small and shallow notches, in combination with a rotating actuating-wheel having yielding bearing and provided with teeth corresponding to said notches and maintained in operative contact with said printing-wheel by spring-pressure, substantially as and for the purpose described

8. The combination of the driving-shaft I, disk O, projection o', tripping-lever Q, spring w', rock-shaft Q', plate q', and sliding pawl q with the actuating-wheel R and printing-

wheel R′, substantially as and for the purpose described.

9. The combination of the driving-shaft I, disk O, projection o', tripping-lever Q, spring w', rock-shaft Q′, and sliding pawl q with the actuating-disk R, provided with a tooth r^2, and the printing-wheel N^3, substantially as and for the purpose described.

10. In a time-stamp, the combination of a rotatory peripherally-typed printing-wheel, a rotating actuating-wheel R, rock-shaft Q′, tripping-lever Q, arm q', spring w', sliding pawl q, spring q^2, and rigid projection q^5, substantially as and for the purpose described.

11. In a time-stamp, the combination of a rotatory peripherally-typed printing-wheel, a rotating actuating-wheel R, rock-shaft Q′, spring w', tripping-lever Q, arm q', and sliding pawl q, and spring q^2, substantially as and for the purpose described.

12. In a time-stamp, the combination of a rotatory peripherally-typed printing-wheel, rock-shaft Q′, arm q', slotted and sliding click q, having beveled edge, spring q^2, and motor-wheel R, the latter having teeth operating upon said bevel to slide backward said click and engage therewith alternately according to the movement of the rock-shaft, substantially as and for the purpose described.

13. The combination of rotating motor-wheel R, having tooth r^2 and rotating upon movable bearing carried by oscillating bracket r, with spring r^5, stud r^7, and rotatory peripherally-typed printing-wheel N^3, provided with notches n^4, substantially as and for the purpose described.

14. In a time-stamp, the combination of rotatory notched printing-wheel N^3, with rotating motor-wheel R, carrying actuating-tooth r^2, movable supporter r^3, and spring r^5, substantially as and for the purpose described.

15. In a time-stamp, the combination of a rotatory printing-wheel, provided with notches, with a rotatory actuating-wheel, provided with teeth engaging in said notches, one of said wheels being mounted upon a movable stud or bearing and held in operative position relative to the other wheel by means of spring-pressure, substantially as and for the purpose described.

JACOB GANSS.

Witnesses:

G. T. MIATT,

D. W. GARDNER.

Correction in Letters Patent No. 486,458.

It is hereby certified that in Letters Patent No. 486,458, granted November 22, 1892, upon the application of Jacob Ganss, of Brooklyn, New York, for an improvement in "Time-Stamps," an error appears in the printed specification requiring correction as follows: In line 74, page 4, the word "and" should be stricken out; and that the Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 17th day of January, A. D. 1893.

[SEAL.]

CYRUS BUSSEY,

Assistant Secretary of the Interior.

Countersigned:

W. E. SIMONDS,

Commissioner of Patents.

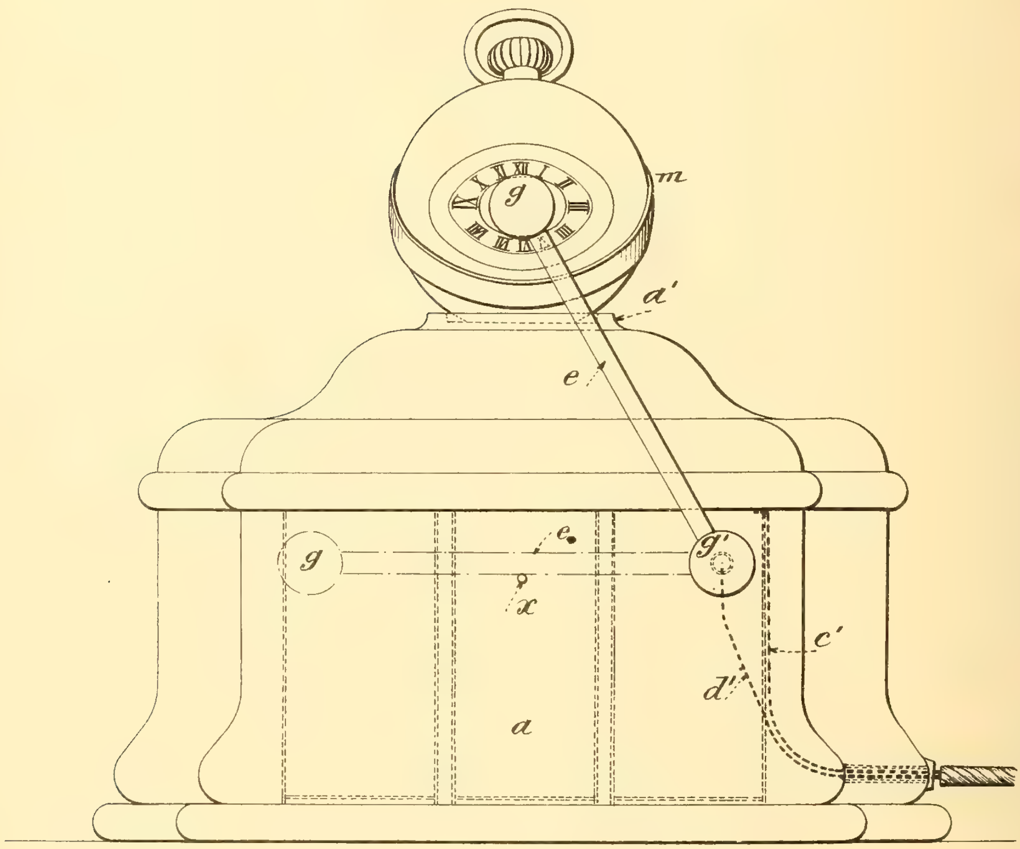
(No Model.) 2 Sheets—Sheet 1.

B. HAAS, Jr. & G. TROUVÉ.

ILLUMINATED TIMEPIECE.

No. 486,563. Patented Nov. 22, 1892.

FIG_1_



Witnesses.
Thomas P. Simpson
Robt. Aiton

Inventors
Benjamin Haas Jr
& Gustave Trouvé
by Wm H Babcock
Attorney

(No Model.) 2 Sheets—Sheet 2.

B. HAAS, Jr. & G. TROUVÉ.

ILLUMINATED TIMEPIECE.

No. 486,563. Patented Nov. 22, 1892.

FIG_2_

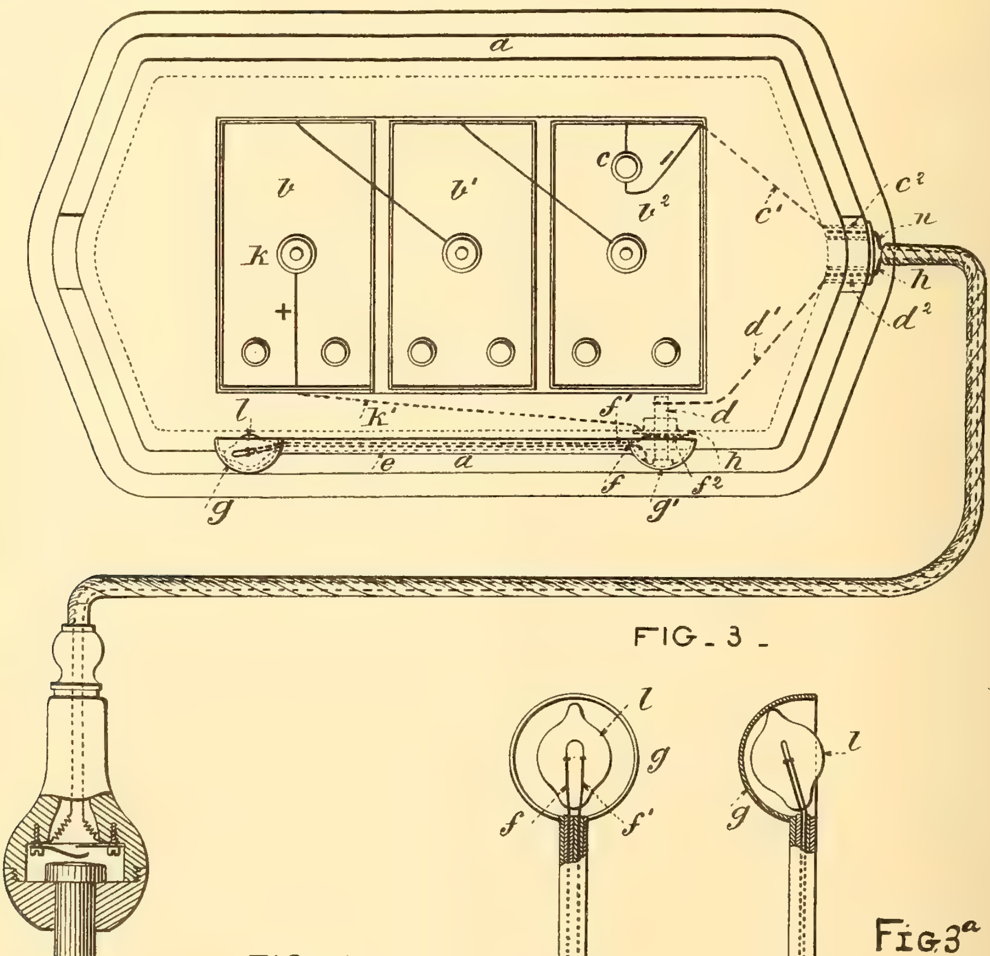
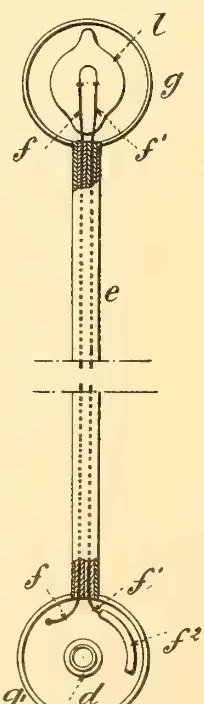


FIG_3_



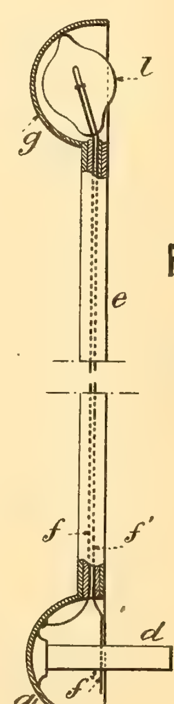
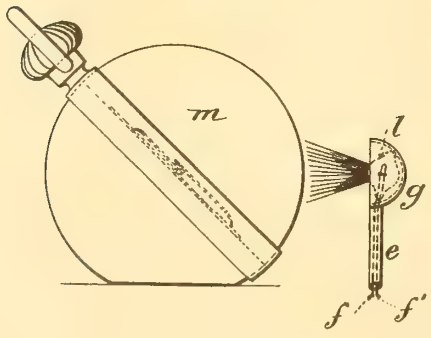


FIG 3^a

FIG_4_



Witnesses.
Thomas P. Simpson
Robt. Aiton.

Inventors.
Benjamin Haas Jr
and Gustave Trouvé
by Wm H Babcock
Attorney

UNITED STATES PATENT OFFICE.

BENJAMIN HAAS, JR., AND GUSTAVE TROUVÉ, OF PARIS, FRANCE.

ILLUMINATED TIMEPIECE.

SPECIFICATION forming part of Letters Patent No. 486,563, dated November 22, 1892.

Application filed November 9, 1891. Serial No. 411,332. (No model.) Patented in France September 17, 1891, No. 217,013.

To all whom it may concern:

Be it known that we, BENJAMIN HAAS, Jr., and GUSTAVE TROUVÉ, citizens of the Republic of France, residing in the city of Paris, in the said Republic, have invented certain new and useful Means for Illuminating the Dials of Timepieces, (for which we have obtained a patent in France, No. 217,013, dated September 17, 1891,) of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, making part of the same.

The object of the said invention is to provide a watch, clock, or other timekeeper with a movable device whereby at will on the closing of an electric circuit the face or dial of the said timepiece will be illuminated to show the time of night, the battery which generates the electricity being inclosed in a case, which serves as a support for the said timepiece or is attached thereto and removable therefrom.

To this end the said invention consists in the construction and combination of parts hereinafter more particularly set forth and claimed.

In the accompanying drawings, Figure 1 represents a front elevation of a watch-supporting casing, the watch, and the external part of the electrical devices embodying our invention. Fig. 2 represents a plan view of the said casing and inclosed devices, the casing-cover and watch being removed. Figs. 3 and 3ª represent detail views of the electric lamp and lamp-supports, partly in elevation and partly in section, taken at right angles to each other. Fig. 4 represents a detail view of the watch used therewith.

The battery, consisting of cells b b' b^2, but for which a single cell or any convenient number of cells may be substituted, is inclosed within a casing a, of any convenient size, material, or form. On this casing, as shown in Fig. 1, a watch m of any desired kind is mounted. An electric lamp l when turned into position before the dial of this watch and lighted, illuminates the said dial for the purpose stated, and is provided with a small reflector g to intensify its light. The said lamp and reflector are supported by a tubular arm e, having its lower end shaped into a nearly-hemispherical shell g', resembling the said reflector and having a rigid pivot-stud d, integral with the said arm, extending horizontally from the center of the said shell. The filament or incandescent wire f of the said lamp is connected to wires f' f^2, which are extended downward, with insulating-coatings z z' side by side within the said tubular support, the wire f' being connected at its lower end to the shell g' and the wire f^2 to a curved insulated spring-plate f^3, which is continually in yielding contact with a plate h, fixed to the casing a. From this plate h a wire k' extends to one of the poles k of the battery. From the pivot-stud d a wire d' extends to the inner end of a conducting tube or rod d^2, fixed in the said casing. A second and similar rod or tube c^2 is fixed in the said casing in proximity to the above-mentioned one and connected in like manner by a wire c' to the other pole c of the said battery. From these tubes or rods c^2 d^2 wires n n', suitably wrapped, extend outward into a hanging knob p, provided with a push-rod p', operated after the manner of the ordinary push-button to close the circuit by pressure. When thus closed, the circuit is from pole k, through wire k', to fixed plate h, thence through plate f^3, wire f^2, filament f, wire f', shell g', pivot d, wire d', tube d^2, wires n' n, tube c^2, and wire c' to the other pole c of the battery. The pivot-stud or axis d is mounted in the casing a and allows the tubular support e to be freely turned up so as to present the lamp l in front of the watch-dial or turned down into the position shown in dotted lines in Fig. 1. The yielding yet resilient character of the plate f^3 maintains the electrical connection at this point whatever the position of the lamp and its support. When the operator desires to know the time, he turns up the lamp into position before the watch and presses the push-rod p'. Afterward he relaxes this pressure and turns the lamp down to its former position. It is then out of use and out of the way. A stop x is provided on the front of the said case to prevent the said tubular support and lamp from being turned down too low. The watch m is preferably held in a recessed seat or watch-holder a', formed on the top of the cover of the casing a. Of course a clock or other timepiece may be substituted.

Having thus fully set forth our invention,

what we claim as new, and desire to secure by Letters Patent, is—

A timepiece provided with a supporting-casing and an electric battery inclosed in the said casing, in combination with an electric lamp operated by the said battery, a pivoted tubular supporting-arm *e* for said lamp, having a shell *g'* formed at its lower end and provided with a pivot-stud *d*, a fixed contact-plate *h*, electric conductors making connection through the said lamp respectively to the said shell and pivot-stud and to the said plate, and additional conductors extending from said plate and said stud to the poles of the battery, substantially as set forth.

In witness whereof we have hereunto set our hands in presence of two witnesses.

BENJAMIN HAAS, Jr.
GUSTAVE TROUVÉ.

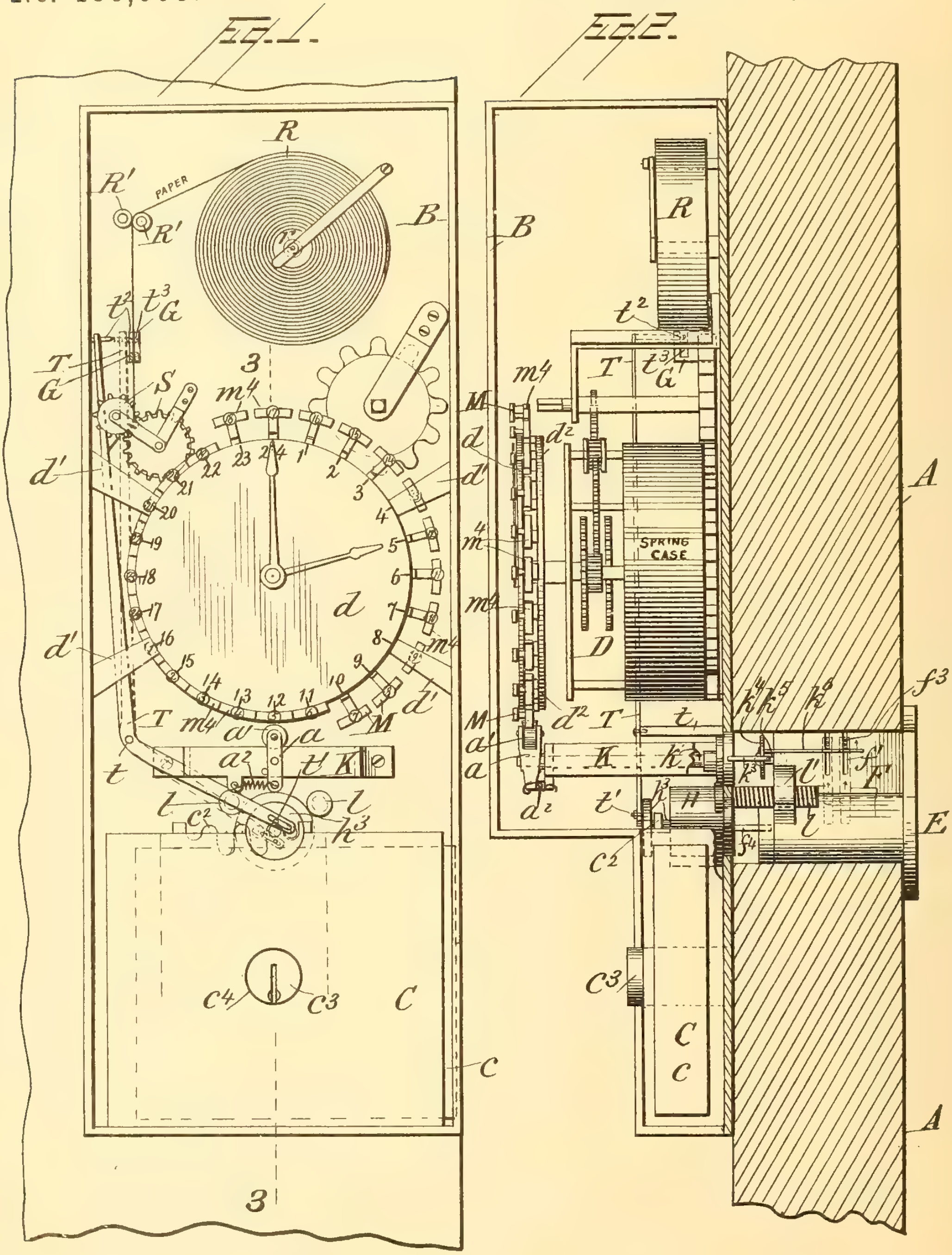
Witnesses:
A. HUBAM,
GEORGE LAURENT.

(No Model.) 3 Sheets—Sheet 1.

E. S. PHELPS.

TIME LOCK.

No. 486,603. Patented Nov. 22, 1892.



Attest:

F. H. Schott

Alfred T. Gage

Inventor:

Edwin S. Phelps

by

Attorney.

(No Model.) 3 Sheets—Sheet 2.

E. S. PHELPS.

TIME LOCK.

No. 486,603. Patented Nov. 22, 1892.

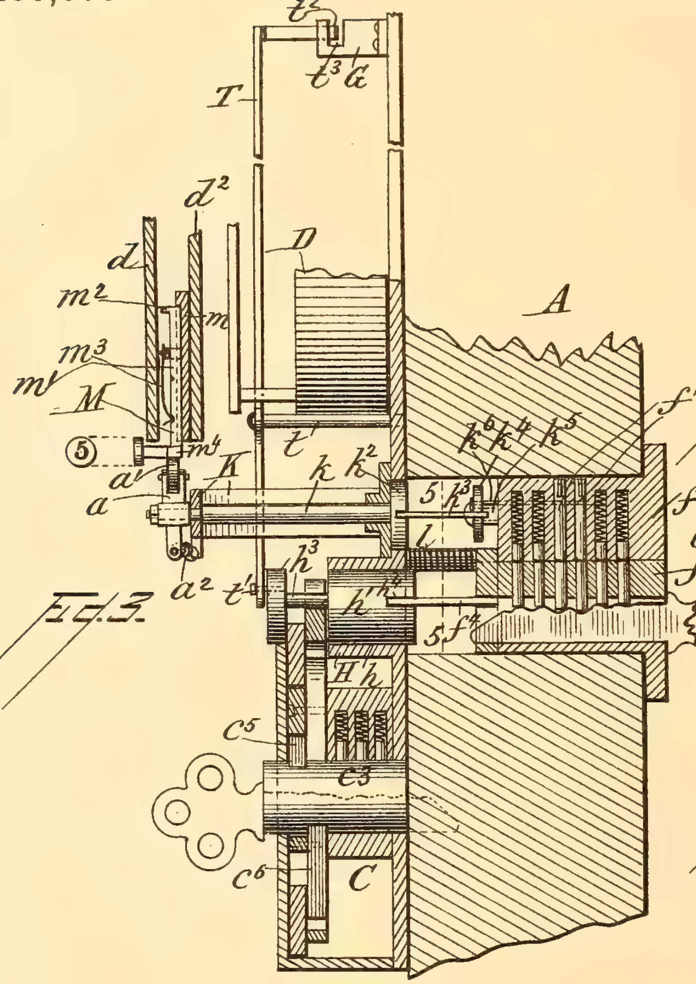


Fig. 3.

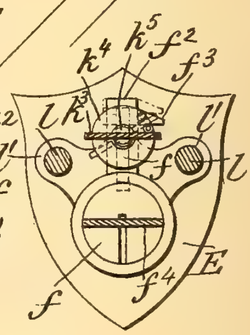


Fig. 5.

Fig. 6.

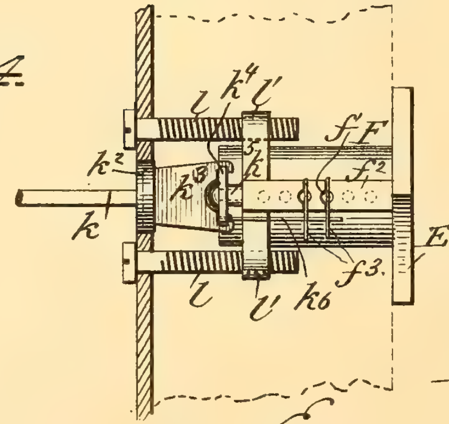


Fig. 4.

Attest:

H. H. Schott

Alfred T. Gage

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Edwin S. Phelps

by W. G. Henderson,

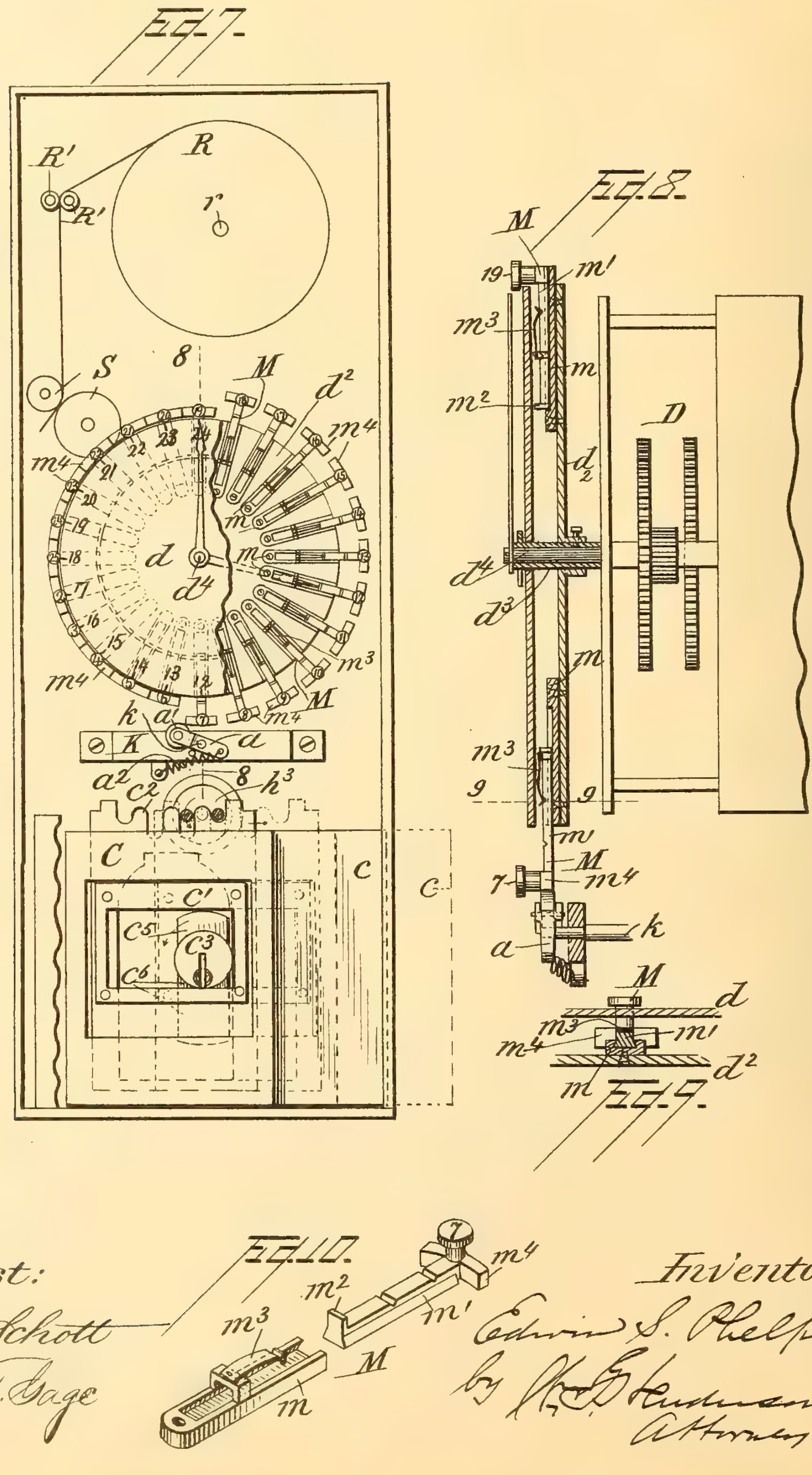
Attorney.

(No Model.) 3 Sheets—Sheet 3.

E. S. PHELPS.

TIME LOCK.

No. 486,603. Patented Nov. 22, 1892.



Attest:

F. H. Schott

Alfred T. Gage

Inventor

Edwin S. Phelps,

by W. G. Henderson,

Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWIN SANFORD PHELPS, OF LEAVENWORTH, KANSAS.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 486,603, dated November 22, 1892.

Application filed June 2, 1892. Serial No. 435,254. (No model.)

To all whom it may concern:

Be it known that I, EDWIN SANFORD PHELPS, a citizen of the United States, residing at Leavenworth, in the county of Leavenworth and State of Kansas, have invented certain new and useful Improvements in Time-Locks; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in time-locks such as are applied to doors of stores, offices, banks, safes, &c.; and it has for its object the construction of such a device whereby the door with which it is used can be locked in such a manner that only during a certain predetermined time it can be unlocked by a certain key intrusted to a subordinate, for instance, and which at the same time can be unlocked by a different key carried by the principal at any time.

The invention has, further, for its object the provision of a time mechanism that can be applied to any lock provided with tumblers or dogs to guard the key-hub, whereby the above-named objects may be secured, and also the provision of such a mechanism that is of simple construction and application and which is efficient in its purpose.

The invention also has for its object the provision of a means whereby it can be ascertained at what time or times the door may have been unlocked from the exterior.

The invention consists in the novel construction, combination, and arrangement of parts, such as will be hereinafter fully described, pointed out in the appended claims, and illustrated in the accompanying drawings.

In the accompanying drawings, in which similar letters of reference designate corresponding parts, Figure 1 is a front elevation of a locking mechanism embodying the invention, the front of the casing being removed. Fig. 2 is a side elevation of the same, the side piece of the casing being removed. Fig. 3 is an enlarged detail view showing a cross-section on the line 3 3 of Fig. 1. Fig. 4 is a similar view showing a plan view of the casing for the outer key-hub and its adjunctive parts. Fig. 5 is a similar view showing a rear elevation of the casing carrying the outer key-hub and several of the parts connected therewith. Fig. 6 is a detail view showing one of the movable tumblers carried by the outer key-hub casing. Fig. 7 is a detail view showing a front elevation, illustrating the two dials, the outer of which is partly broken away, and the lock proper, the casing of the latter being removed. Fig. 8 is an enlarged detail view showing a section on the line 8 8 of Fig. 7. Fig. 9 is a detail view showing a section taken through the line 9 9 of Fig. 8, and Fig. 10 is a detail perspective view showing one of the extension-arms.

Referring to the drawings, A designates the door; B, the main casing, which carries the several different parts of the lock; C, the lock proper, and D the clock mechanism.

E designates the escutcheon secured to the outer face of the door and has secured to its back the casing F, which carries the key-hub, through which the bolt of the lock proper can be operated from the outer side of the door.

The lock C is secured to the part of the main casing B, and it consists, primarily, of a bolt c, suitably recessed on its inner side for the reception of the dog c', which has a rack c^2 formed on its upper edge. The latter normally extends above the surrounding casing. The key-hub c^3 is seated in a socket c^4 and is provided with usual tumblers and the arms c^5 and c^6. By means of the said arms the hub will when rotated move the bolt c and depress the dog c' during such movement. The dog being held normally by the arm c^5 in engagement with the lantern-gear h^3, the bolt can be moved until the dog is released of such engagement, which is accomplished by its depression by the said arm. By means of the hub c^3 the lock can be operated at any time from the interior.

The main plate of the casing B is perforated at h, immediately above the lock C, and has secured thereto so that it will register with the said opening the sleeve H, in which is journaled the spindle h', provided with a suitable provision against longitudinal move-

ment, but which will not interfere with its free rotation. To the front end of this spindle the lantern-gear h^3 is attached and which meshes with the rack c^2 of the dog c' and will through such connection on the rotation of the spindle move the bolt c to lock or unlock the door. The rear end of the spindle is diametrically slotted at h^4.

To the back of the main plate of the casing B the casing F is adjustably secured by the screws $l\,l$, passing through the main plate and engaging with the threaded lugs $l'\,l'$ of the casing. Their adjustable connection allows the lock to be fitted to any door, whatever its thickness might be. The front end of the casing F has secured to it or made integral with it the escutcheon E. In the casing is journaled the key-hub f, suitably slotted for the reception of a key, and it is secured against turning by other than the proper key by the tumblers $f'\,f'$, the upper ones of which are seated in the extension f^2 and the lower ones in the hub. Two of the upper tumblers are replaced by the tumbers shown in Fig. 6, which are the ordinary tumblers extended and provided at their upper ends with extensions or lugs $f^3\,f^3$, the sides of the extension being slotted to receive the said lugs. The purpose of these peculiarly-constructed tumblers will be explained hereinafter. The inner end of the key-hub is provided with a diametrical slot, in which and the slot h^4 in the end of the spindle h' the ends of the plate f^4 are respectively seated. Through this connection any rotation of the key-hub f by a proper key will be communicated to the spindle h' and the lantern-gear h^3, which, meshing with the rack of the dog c', will move the bolt c to lock or unlock the door, as the case may be.

The key-hub f is provided with two different keys, one of which will when inserted adjust all the tumblers to allow the turning of the hub, except those which are provided with projecting lugs $f^3\,f^3$, and consequently cannot turn the spindle so long as these tumblers are in the way. An automatic time mechanism, which will be described farther on, is provided, however, which will during a certain predetermined period of time raise the said interfering tumblers and allow the key to turn the hub, which it cannot do outside of such period, as the tumblers are then lowered into position and the hub cannot be turned except by another key which will make the proper adjustment of all the tumblers. This second key will also turn the hub while the dogs or tumblers are elevated.

The purposes to which a lock constructed so that a certain key will operate the lock only during a certain period of time and a second key will operate it at all times are obvious and need not be herein again set forth.

The mechanism which automatically raises and lowers the tumblers of the outer key-hub will now be described.

The clock mechanism D, secured to the upper part of the main plate of the casing B, is that which is ordinarily used in twenty-four-hour clocks. The stationary dial-plate d is supported in any suitable manner, in the present instance being shown as supported by the bracket $d'\,d'$, attached to the casing. The hours, one to twenty-four, inclusive, are indicated on its face. Beneath the fixed dial a moving dial d^2 of the same diameter as the former is mounted. The moving dial consists of the metallic plate d^2, mounted on the sleeve d^3, journaled on the shaft d^4, and which carries the hour-hand, so as to be rotated with the same. On the face of this plate, near its edge, are radially arranged the expansion-arms M, twenty-four in number and equidistant apart. Each of these arms is formed of a shank m, secured to the plate, and the movable portion m', dovetailed to the shank, so that it can be readily moved radially. Any other connection which will allow the radial movement of the portion m' can be used without departing from the spirit of the invention. To limit the movement of the portion m', its inner end is provided with a stop m^2, which will come in contact with stops suitably placed upon the dial. The spring m^3 is provided, which will by engaging with the notches in the extensible portion m' serve to hold the said part in its adjusted position. The outer end of each of the extension-arms has secured thereto a segmental piece m^4, which is so formed that it will project slightly above the fixed dial-plate and is of such a length that it will not interfere with the movement of its neighbors. These extension-arms are numbered consecutively from "1" to "24," inclusive, and they are so arranged that number "12" will be directly under the hour-hand. The object of these extension-arms is to press upon a lever or arm a, which will through intermediate mechanism, hereinafter explained, elevate the two tumblers $f^3\,f^3$. For an instance, suppose that a merchant should desire to have the lock of his store so adjusted as to allow the porter, to whom the key is intrusted which will only operate the hey-hub while the said tumblers are raised, to use his key between the hours of seven o'clock a. m. and six o'clock p. m. Before going home at night he draws out all of the extension-arms m numbered "7" to "18," inclusive. The arms so arranged will press upon the arm a for the time mentioned, and through the intermediate mechanism uphold the tumblers $f^3\,f^3$. As each of the segments will control the tumblers for an hour each, they may be so arranged as to operate at any desired number of intervals. The number of the arms may be increased to forty-eight, or several of them may be replaced by two each, so that the hours may be split if necessary. As such a change would not involve any essential change in the principle, they need not be more specifically described.

The intermediate mechanism connecting the moving dial with the tumblers $f^3\,f^3$ of the key-hub will now be described.

K designates a frame attached to the main plate of the casing immediately below the clock mechanism and has journaled in it the outer end of the shaft k, the inner end of the latter having secured thereon the disk k^2, which is journaled in a suitable bearing formed in the main plate. The outer face of the disk is provided with a diametrical slot, with which the end of the plate k^3 registers. The outer end of the plate is bifurcated and engages with the notched periphery of the plate k^4, rotatably mounted on the pin k^5, screwed into the extension f^2 of the casing F. Attached to the plate k^4 near its edge is an arm k^6, which extends under the projections of the tumblers f^3 f^3. On the outer end of the shaft k is secured the arm a, provided with a friction-roller a' on one end. A spiral spring a^2 connects the other end of the arm with the frame K and serves to hold the arm in an upright position, so that if the arms M should be extended they would bear against the friction-roller and incline the arm to the left.

R designates a roll of paper or tape carried by the shaft r.

S S are feed-rollers, formed of rubber or other suitable material, driven at a uniform rate of speed by suitable connections with the clock mechanism, and serve to draw the graduated tape between the guides G G.

R′ R′ are guide-rolls which serve to support the paper in its course. As the paper is withdrawn from the roll, it is deposited in a suitable receptacle to which access is had only by a person in authority.

T designates a lever pivoted on the shaft t and provided with a slot in its lower end, which registers with a pin t', projecting eccentrically from the lantern-gear h^3, so that if the latter should be turned to unlock the door from the exterior the upper end of the lever would be moved in such a manner that the punch t^2, secured to its upper end, would perforate the paper as it passed the slots t^3 t^3 in the guides G G. By this means it could always be ascertained by an examination of the graduated tape at what hours the door may have been unlocked from the exterior.

It might be well to observe that the arrangement of the tumblers guarding the key-hub f is not arbitrary, and any other obvious arrangement may be made without departing from the spirit of the invention, and, also, that the plates may be made to fit a door of any width.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a device of the class described, the combination of a key-hub guarded by tumblers with a clock mechanism for raising one or more of the said tumblers to allow the use of different keys during different periods of time and the bolt operated by the said hub, substantially as described.

2. In a locking device, the combination of a key-hub guarded by tumblers, the bolt operated by the said hub, the moving dial, the extension-arms carried by the said dial, and the intermediate mechanism connecting the said arms with the said tumblers, substantially as described.

3. In a locking device, the combination of the key-hub guarded by tumblers, the bolt operated by the said tumblers, the clock mechanism for raising or lowering one or more of the said tumblers, and the recording mechanism to register the turning of the said hub, substantially as described.

4. In a locking device, the combination of the casing, the key-hub journaled therein, the bolt operated by the said hub, the tumblers seated in the said casing, the arm engaging with one or more of the said tumblers, and the mechanism for moving the said arm to raise or lower the said tumbler or tumblers, substantially as described.

5. In a locking device, the combination of the casing, the key-hub journaled therein, the bolt operated by the said hub, the tumblers seated in the said casing to lock the hub relatively thereto, the rotatable disk mounted on the casing, the arm carried by the disk and engaging with one or more of the said tumblers, the shaft connected with the said disk, the arm attached to the front end of the said shaft, the moving dial-plate, the extension-arms secured thereon and adapted to bear against when extended the arm connected with the shaft, substantially as described.

6. In a locking device, the combination of the casing, the key-hub journaled therein, the bolt operated by the said hub, the tumblers seated in the said casing to lock the hub relatively thereto, the disk rotatably mounted on the casing, the arm carried by the disk and engaging with one or more of the said tumblers, the shaft connected with the said disk, mechanism for partly rotating the said shaft, the segment mounted on the shaft, having cam-faces, and the spring adapted to press upon the cam, substantially as described.

7. In a locking device, the combination of the lock proper consisting, essentially, of a bolt and a dog for moving the same, the said dog having a rack formed on its upper edge, and the rotatable lantern-gear meshing with the said rack, substantially as described.

8. In a locking device, the combination of the lock proper consisting, essentially, of a bolt and a dog for moving the latter, the said dog having a rack formed on its upper edge, the lantern-gear meshing with the said rack, the key-hub, and the shaft connecting the said hub with the lantern-gear, substantially as described.

9. In a locking device, the combination of the lock proper consisting, essentially, of a bolt and a dog for moving the latter, the said dog having a rack formed on its upper edge, the rotatable lantern-gear meshing with the

said rack, the key-hub provided with arms to operate the said dog to disengage it from the lantern-gear, substantially as described.

10. In a locking device, the combination of the lock proper consisting, essentially, of a bolt and a dog for moving the same, the said dog having a rack formed on its upper edge, the lantern-gear meshing with the said rack, the key-hub, the shaft carrying the said lantern-gear, the inner ends of the said shaft and key-hub having diametrical slots, and the plate with its ends seated in the said slots, substantially as described.

11. In a locking device, the combination of the lantern-gear adapted to be rotated by the key-hub, the pin eccentrically mounted on the outer end thereof, the lever engaging with said pin at its lower end and having a punch attached to its upper end, the tape-roll, the guide, and the guide-rolls, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN SANFORD PHELPS.

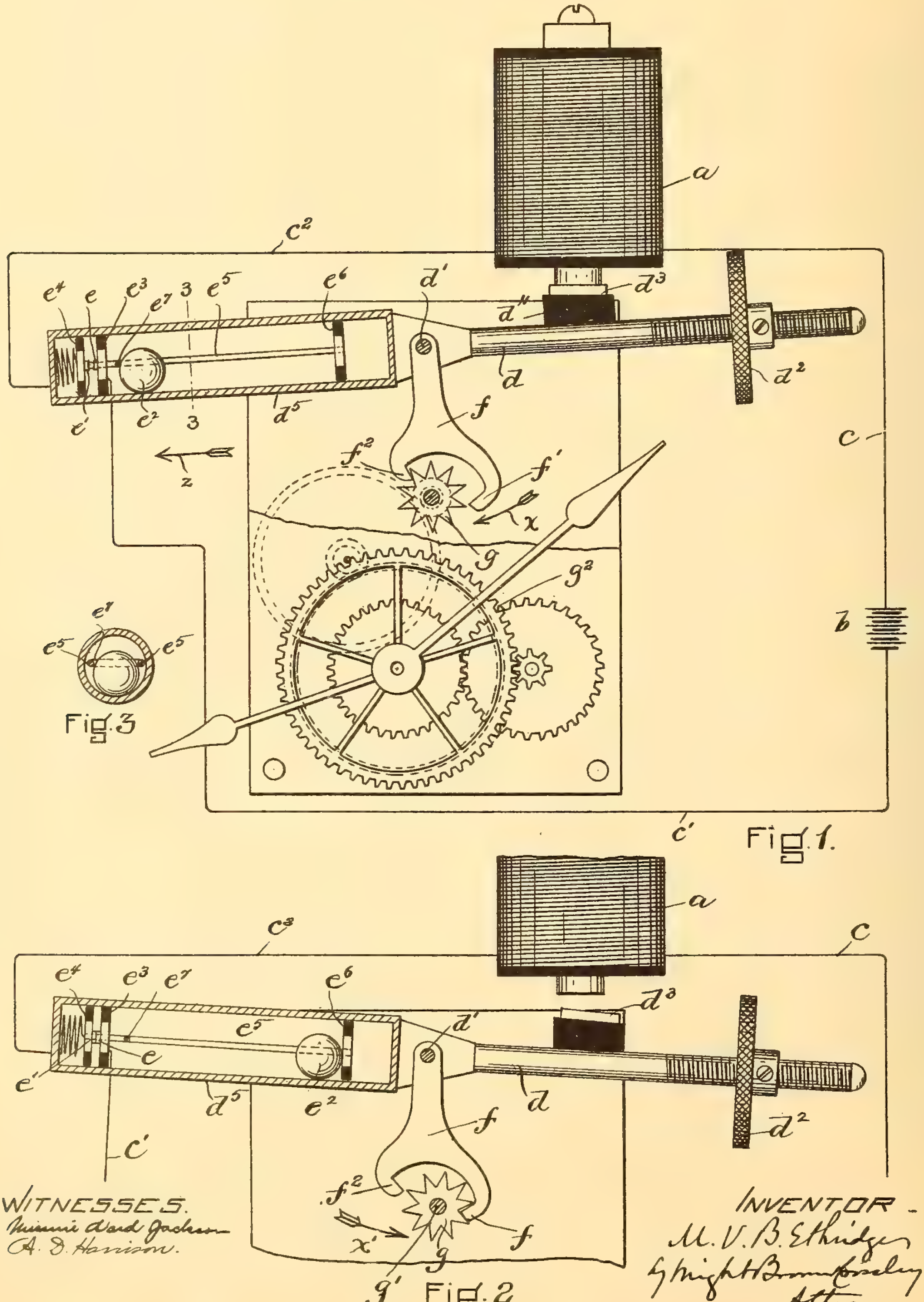
Witnesses:
G. M. HURLEY,
C. P. RUTHERFORD.

(No Model.) 2 Sheets—Sheet 1.

M. V. B. ETHRIDGE.

ELECTRIC CLOCK.

No. 486,838. Patented Nov. 22, 1892.



WITNESSES.
Minnie Ward Jackson
A. D. Harrison.

INVENTOR -
M. V. B. Ethridge
by Wright Brown & Crossley
Attys.

(No Model.) 2 Sheets—Sheet 2.

M. V. B. ETHRIDGE.

ELECTRIC CLOCK.

No. 486,838. Patented Nov. 22, 1892.

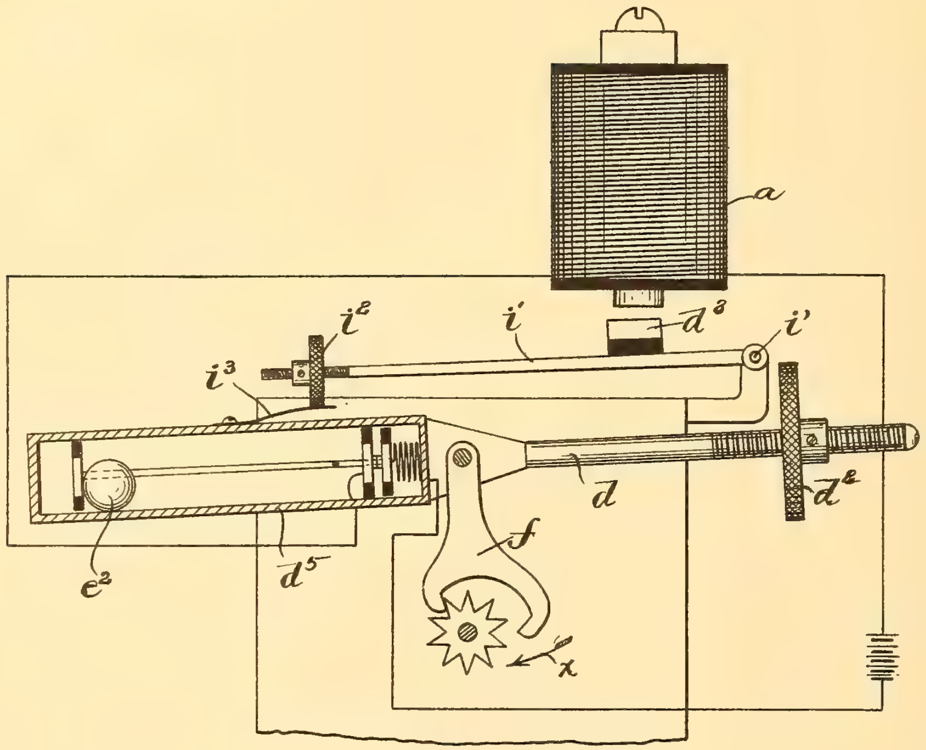


Fig. 4.

WITNESSES.
Minnie Ward Jackson.
A. D. Harrison

INVENTOR.
M. V. B. Ethridge
by Wright Brown & Crossley
Attys

UNITED STATES PATENT OFFICE.

MARTIN V. B. ETHRIDGE, OF EVERETT, ASSIGNOR OF TWO-THIRDS TO HENRY E. WAITE, OF NEWTON, AND JOSEPH H. EASTMAN, OF BOSTON, MASSACHUSETTS.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 486,838, dated November 22, 1892.

Application filed January 18, 1892. Serial No. 418,440. (No model.)

To all whom it may concern:

Be it known that I, MARTIN V. B. ETHRIDGE, of Everett, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

This invention has for its object to provide a simple and effective electro-mechanical motor for impelling a clock-train or other like mechanism; and it consists, mainly, in the improved electro-mechanical motor for clocks, comprising an electric circuit including an electro-magnet, a pivoted lever adapted to be oscillated and provided with a device—such as an escapement-arm—adapted to impart a step-by-step movement to a clock mechanism, a circuit closing and breaking device operated by oscillating movements on said lever, and consisting of, first, a loose weight adapted to be moved independently on said lever by gravitation, and, secondly, two electrodes supported by the lever and arranged to be alternately separated and connected by movements of the weight, said electrodes being included in the electric circuit, and means controlled by the electro-magnet, whereby a movement in one direction is imparted to said lever when the circuit is closed and in the opposite direction when the circuit is broken.

The invention also consists in certain improvements incidental to the general purposes of my invention, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification, Figure 1 represents a side elevation of an electric clock embodying my invention, a part being shown in section. Figure 2 represents a side elevation of a portion of the construction shown in Fig. 1 at a different stage of the operation. Fig. 3 represents a section on line 3 3, Fig. 1. Fig. 4 represents a side elevation showing a different embodiment of my invention.

The same letters of reference indicate the same parts in all the figures.

In the drawings, and referring first to Figs. 1 and 2, a represents an electro-magnet, which is included in an electric circuit, of which b represents the battery or other source of electricity, and c c' c^2 the connecting-wires.

d represents a lever, which is pivoted at d' to a fixed support. Said lever is provided at or near one end with a weight d^2, which is preferably adjustable, and between said weight and the pivot d' with an armature d^3, which is secured to and insulated from the lever by suitable insulation d^4, the armature being arranged to be attracted by the poles of the electro-magnet a.

A circuit closing and breaking device, adapted to be operated by oscillating movements of the lever d, is provided, said device including an electrode e, which is connected with the wire c', an electrode e', which is movable toward and from the electrode e and is connected with the wire c^2, and a loose gravitating weight e^2, which is preferably a ball adapted to roll in a tube or guide d^5, constituting a part of the lever d, the arrangement being such that when the lever is in the position shown in Fig. 1 the weight or ball e^2 will move to the left-hand end of the tube d^5 and thus cause the separation of the electrode e' from the electrode e and break the circuit, and when the lever is in the position shown in Fig. 2 the ball will roll toward the other end of the tube d^5, and, striking a movable piece connected with the electrode e', will move said electrode into contact with the electrode e, thus closing the circuit. When the circuit is broken, as shown in Fig. 1, the weight d^2, acting on the lever d, depresses the end carrying the armature and separates the latter from the poles of the electro-magnet. When the circuit is closed, as shown in Fig. 2, the magnet, becoming energized, attracts the armature, overcoming the weight d^2 and raising the end of the lever carrying said weight. It will be seen, therefore, that the lever d is oscillated at a regular predetermined rate by the alternating action of the magnet and the weight d^2.

The details of construction of the circuit closing and breaking device may be variously modified. I have here shown the electrode e supported by a ring e^3 of insulating material, the wire c' being connected with said ring,

which is affixed to the interior of the tube d^5. The movable electrode e' is affixed to a ring e^4 of insulating material, which is movable in the tube d^5 and is provided with two rods e^5 e^5, which are connected with a movable ring e^6 of insulating material, located near the right-hand end of the tube. When the ball e^2 reaches the position shown in Fig. 1, it strikes a cross-bar e^7, extending between the rods e^5 e^5 and gives said rods and the ring e^4 and electrode e' a movement in the direction indicated by the arrow z in Fig. 1, thus breaking the circuit. When the ball reaches the position shown in Fig. 2, it strikes the ring e^6 and gives the latter, the rods e^5, ring e^4, and electrode e' a movement in the opposite direction, thus closing the circuit. The movable ring e^4 is connected with the conducting-wire c^2, a portion of the latter being disposed in the tube d^5 in the form of a helix, as shown in Figs. 1 and 2, in order that the ring e^4 may have the requisite freedom of movement within the tube. The tube is preferably of glass, this material affording the desired insulation and presenting a smooth surface on which the ball e^2 may roll with the minimum of a friction. I prefer to exhaust the air from the tube to prevent the corrosion or sparking of the electrodes.

f represents an escapement-arm, rigidly secured to the lever d and adapted to be oscillated thereby. Said arm is provided with pallets f' f^2, which are formed so that the oscillating movements of said arm will impart a step-by-step rotation to an escape-wheel g, the pallet f' being moved in the direction indicated by the arrow x in Fig. 1 by the movement of the lever which takes place when the circuit is broken and the lever is moved by the weight, said pallet striking a tooth of the wheel g and giving the latter a partial rotation while the lever is moving from the position shown in Fig. 1 to that shown in Fig. 2. When the lever is being attracted by the armature, the pallet f^2, moving in the direction indicated by the arrow x' in Fig. 2, strikes another tooth of the wheel g and gives the latter another partial rotation in the same direction as before, the pallet f' at the same time retreating, so that it does not interfere with the movement of the tooth adjacent to it. The escape-wheel g is affixed to an arbor g', which is geared to a time-train g^2, which may be organized in any suitable way.

It will be seen that the oscillating movements of the lever d are positive, one movement being caused by the action of the weight d^2 and the other by the action of the magnet a. Hence said lever and magnet constitute a motor adapted to give a positive movement to the train g^2.

I do not limit myself to a spherical or rolling weight e^2, but may use any loose weight supported by a pivoted lever adapted to be moved independently by gravitation when said lever is inclined and impart a movement to a movable electrode carried by said lever.

It will be observed that in the construction above described the armature d^3 is attached directly to the lever d, so that the attractive force of the electro-magnet is exerted directly upon said lever. In case there is liable to be any considerable variation in the strength of the current flowing through the electro-magnet, the direct action of the current upon the lever will be objectionable, because when the current is strong a movement of the lever d caused by the attraction of the armature will be more rapid than when the current is weaker. To overcome this objection, I have provided the construction shown in Fig. 4, which I prefer to use when there is liable to be any variation in the strength of the current. In the construction shown in Fig. 4 instead of attaching the armature d^3 directly to the lever d I attach said armature to an intermediate lever or arm i, which is pivoted at i' to a fixed support and is provided at its swinging end with a weight i^2, arranged to exert downward pressure on the end of the lever d opposite the weighted end or the end carrying the weight d^2. The circuit breaking and closing devices are arranged so that the circuit is closed by the movement of the weight e^2 to the left-hand end of the tube d^5, as shown in Fig. 4, and broken by the movement of the weight toward the opposite end of said tube. When the circuit is closed, as shown in Fig. 4, the electro-magnet a attracts the armature d^3 and therefore raises the weighted end of lever i. This movement separates the weight i^2 from a spring i^3, attached to the tube d^5, and permits the weight d^2 to depress the end of the lever on which it is located, thus giving the escapement f a movement in the direction indicated by the arrow x. The tube d^5 is inclined by this movement, so that the weight e^2 gravitates toward the right-hand end of the tube d^5 and thus breaks the circuit, whereupon the armature d^3 is released and falls with the lever i and weight i^2, the latter being thus caused to descend upon the spring i^3 and give the lighter end of the lever d a downward movement, the arm i and its weight being sufficiently heavy to overcome the weight d^2, so that when the circuit is broken the lever is given a movement which causes the escapement f to move in the direction opposite that indicated by the arrow x.

It will be seen that by the arrangement last described and shown in Fig. 4 there can be no variation in the rapidity of either movement of the lever d, each movement being caused by gravitation.

It will be observed that in each of the constructions hereinbefore set forth means controlled by the electro-magnet are provided whereby a movement in one direction is imparted to the lever d when the circuit is closed and a movement in the opposite direction when the circuit is broken. In Figs. 1 and 2 said means include the weight d^2 and the armature d^3, said weight being controlled by the electro-magnet in the sense that it is not per-

mitted to act until the circuit is broken. In Fig. 4 the means include the weight d^2, armature d^3, and weighted arm i.

I claim—

1. The improved electro-mechanical motor for clocks, comprising an electric circuit, including an electro-magnet, a pivoted lever adapted to be oscillated and provided with a device, such as an escapement-arm, adapted to impart a step-by-step movement to a clock mechanism, a loose weight adapted to be moved independently on said lever by gravitation when the lever is inclined, electrodes supported by the lever and arranged to be alternately separated and connected by movements of the weight, said electrodes being included in the electric circuit, and means controlled by the electro-magnet, whereby a movement in one direction is imparted to said lever when the circuit is closed and in the opposite direction when the circuit is broken, as set forth.

2. The combination of an electric circuit, including an electro-magnet, a pivoted lever provided with a guide and with an escapement-arm adapted to be oscillated by said lever, a train, including an escape-wheel, to which a step-by-step movement is imparted by said arm, a loose weight adapted to be moved independently in said guide by gravitation when the lever is inclined, electrodes supported by the lever and arranged to be alternately separated and connected by movements of the loose weight, said electrodes being included in the electric circuit, and means controlled by the electro-magnet whereby a movement in one direction is imparted to said lever when the circuit is closed and in the opposite direction when the circuit is broken, as set forth.

3. The combination of an electric circuit, including an electro-magnet, a pivoted lever provided with a weight and with an escapement-arm adapted to be oscillated by said lever, a train, including an escape-wheel, adapted to be moved step by step by said arm, a loose weight adapted to be moved independently on said lever by gravitation when the lever is inclined, electrodes supported by the lever and arranged to be alternately separated and connected by movements of the weight, said electrodes being included in the electric circuit, a weighted arm pivoted to a fixed support and provided with an armature arranged to be attracted by the electro-magnet when the circuit is closed and thereby elevate the weighted arm, the latter being arranged to exert a downward pressure on the lever against the influence of the weight on said lever when the circuit is broken, the weighted arm giving the lever a movement in one direction when the circuit is broken while the weight on the lever gives the latter an opposite movement when the circuit is closed, as set forth.

4. As an improvement in electric clocks, a lever adapted to be oscillated and provided with a guide and with two electrodes, one fixed and the other movable relatively to the lever, and a loose weight adapted to be moved independently in said guide by gravitation, the arrangement being such that movements of the weight alternately separate and connect said electrodes, as set forth.

5. As an improvement in electric clocks, an oscillatory lever composed in part of an exhausted tube and provided with electrodes and with a gravitating weight, all located in said tube, the arrangement being such that movements of the weight alternately separate and connect said electrodes, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 30th day of December, A. D. 1892.

MARTIN V. B. ETHRIDGE.

Witnesses:
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A. D. HARRISON.

(No Model.)

5 Sheets—Sheet 1.

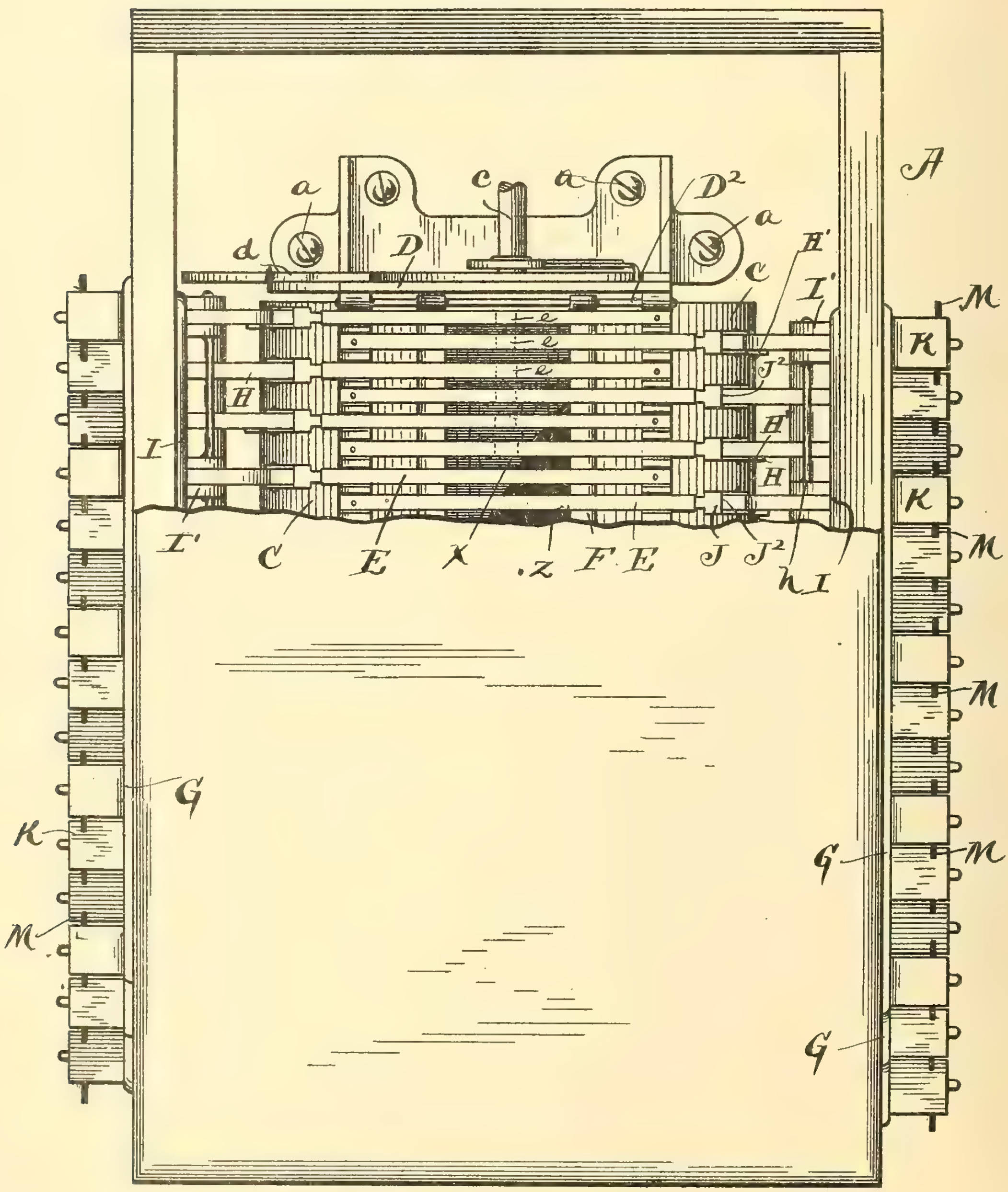
R. D. MORGAN.

WORKMAN'S TIME RECORDER.

No. 486,977.

Patented Nov. 29, 1892.

Fig. 1.



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(No Model.) 5 Sheets—Sheet 2.

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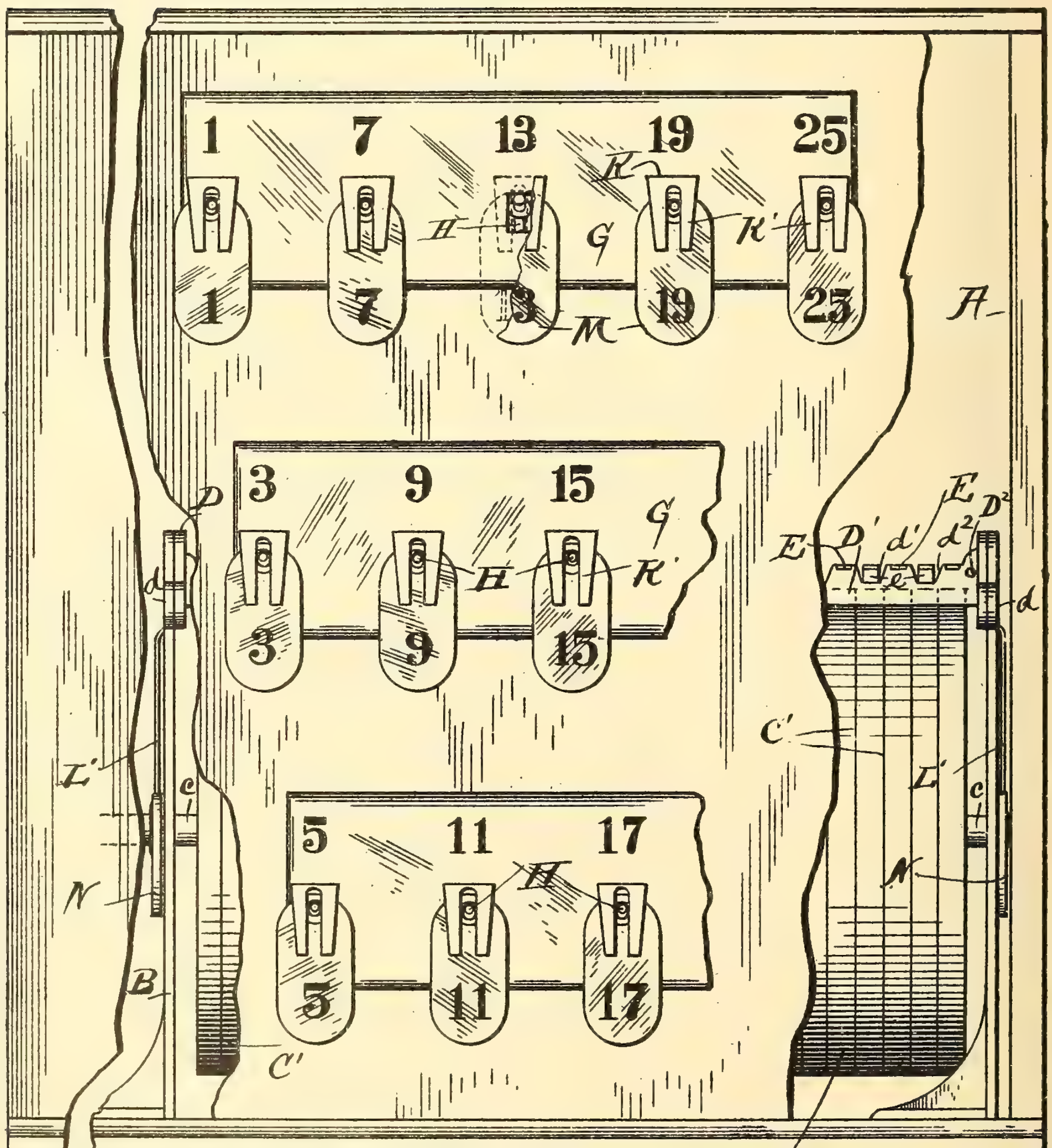
WORKMAN'S TIME RECORDER.

No. 486,977. Patented Nov. 29, 1892.

Fig. 2.



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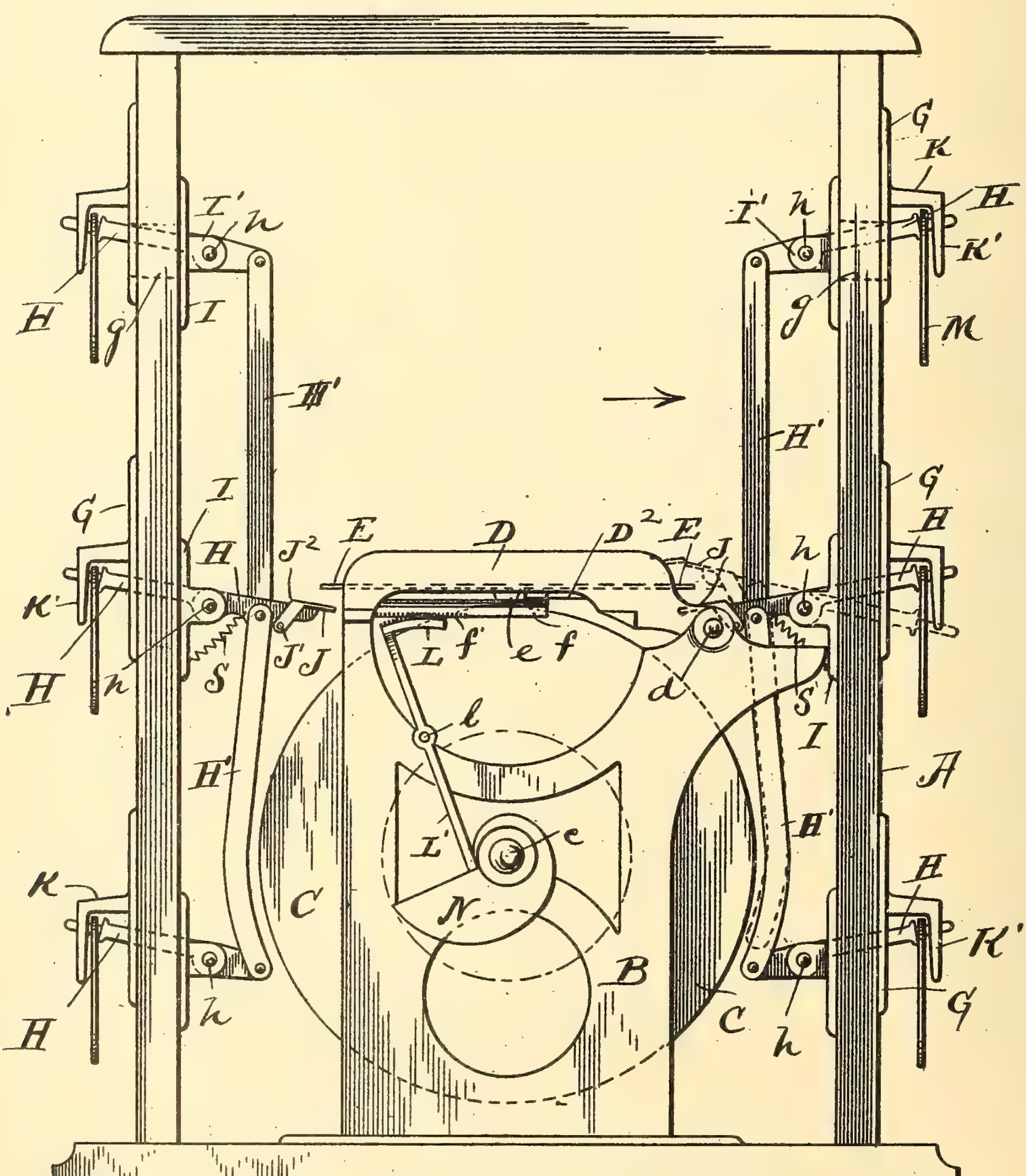
WORKMAN'S TIME RECORDER.

No. 486,977. Patented Nov. 29, 1892.

Fig. 3.



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THE ECKERT LITHOGRAPHING CO., WASHINGTON, D. C.

(No Model.) 5 Sheets—Sheet 4.

R. D. MORGAN.

WORKMAN'S TIME RECORDER.

No. 486,977. Patented Nov. 29, 1892.

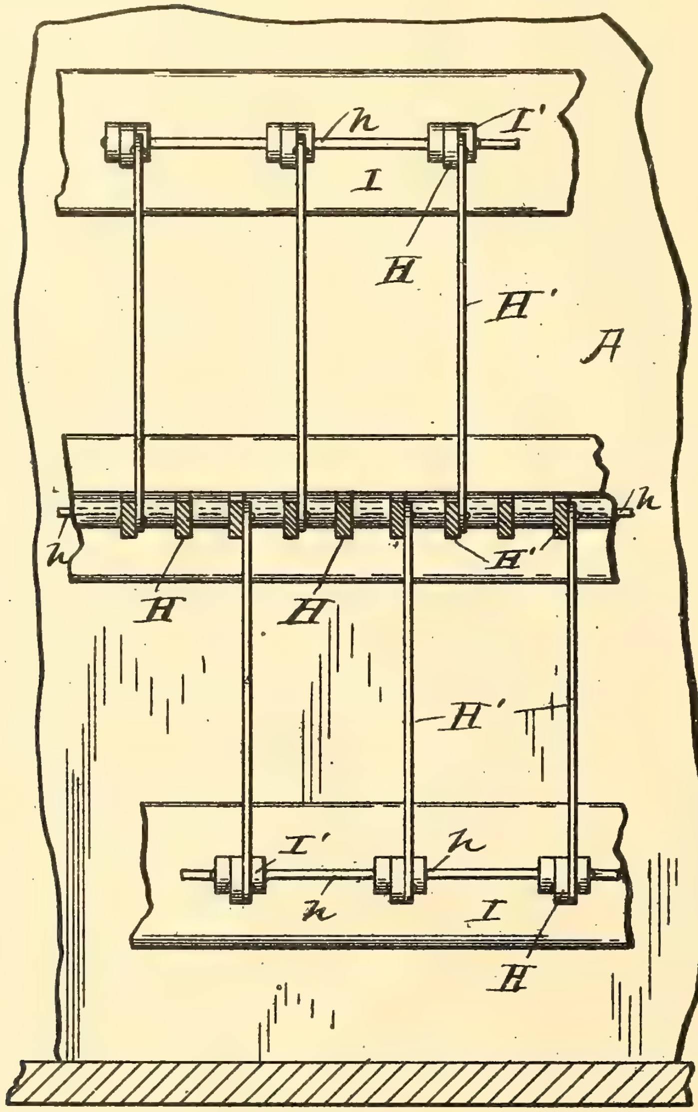

Fig. 4.

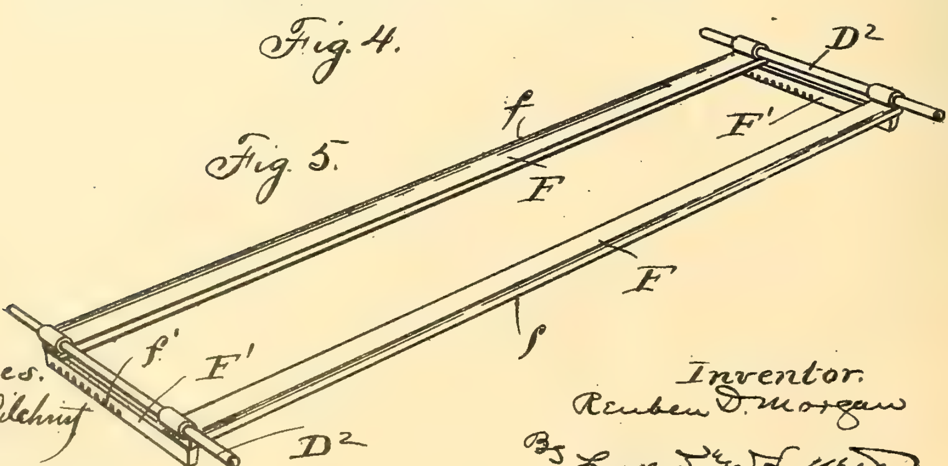

Fig. 5.

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R. D. MORGAN.

WORKMAN'S TIME RECORDER.

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Fig. 6

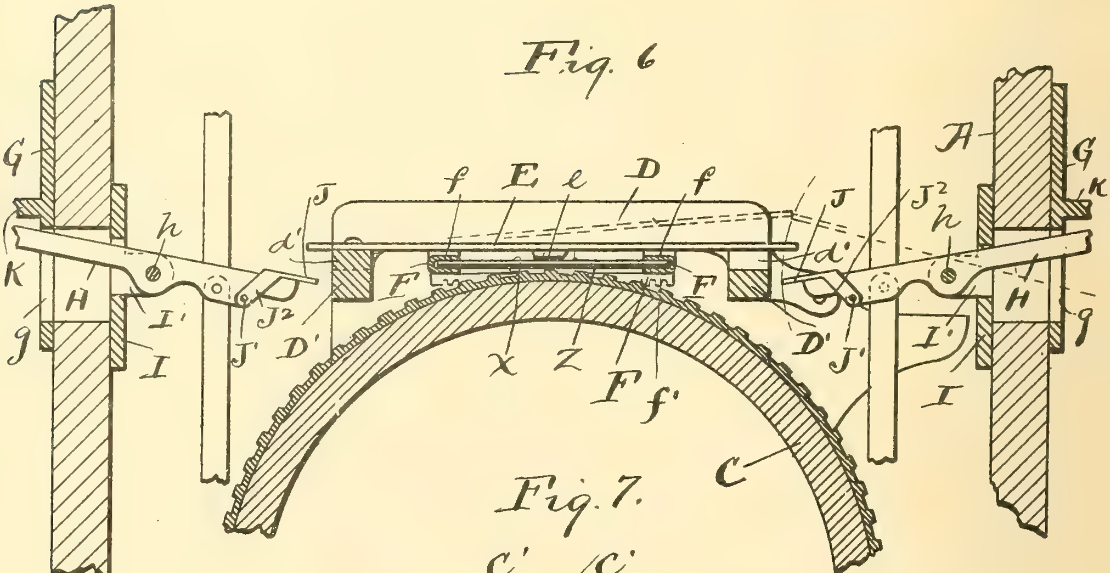


Fig. 7.

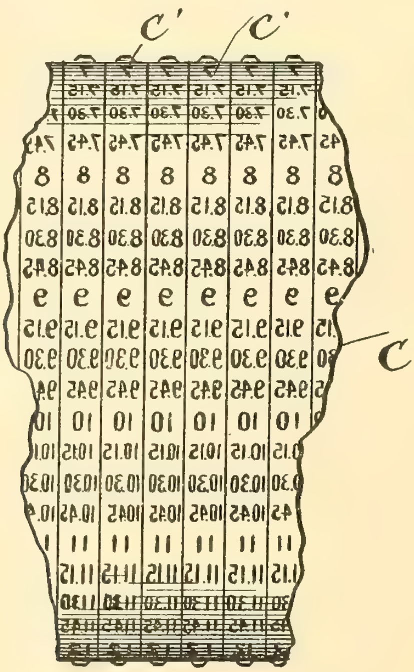
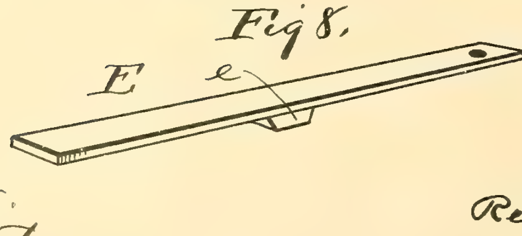


Fig 8.



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THE ECKERT LITHOGRAPHING CO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

REUBEN D. MORGAN, OF CLEVELAND, OHIO.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 486,977, dated November 29, 1892.

Application filed December 4, 1891. Serial No. 414,041. (No model.)

To all whom it may concern:

Be it known that I, REUBEN D. MORGAN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Workmen's Time-Recorders; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

My invention relates to improvements in workmen's time-recorders; and it consists in certain features of construction and in combination of parts hereinafter described, and pointed out in the claims, the object being to provide a machine that is simple in construction and at the same time reliable.

In the accompanying drawings, Figure 1 is a plan view of a machine embodying my invention with the top of the casing partly removed. Fig. 2 is a side elevation of the same, portions being broken away; and Fig. 3 is an end elevation with the end wall removed to show the internal construction. Fig. 4 is an elevation partly in section, of the side of the casing and attached levers shown in Fig. 3, looking in the direction of the arrow, the same exhibiting more clearly the construction. Fig. 5 is a perspective view of the sliding frame for holding and carrying the paper or card upon which the time-record is made and the inked ribbon or carbon-paper instrumental in making such record. Fig. 6 is a section at right angles to the axis of the type-cylinder, showing the relative position of a spring E and its depending projection or hammer e, with reference to the type-cylinder, time-record-receiving card or paper, inking-ribbon or carbon-paper, &c. Fig. 7 is a side elevation of a portion of the type-cylinder. Fig. 8 is a perspective of a spring E detached.

A represents the casing of the machine. This casing is preferably of wood, and to the bottom of the same, at or near either end of the casing, is secured, preferably by means of screws, as at a, an upright frame or standard B, that affords bearing for spindle c on which is mounted the type-cylinder C. The type that represents hours of the day and fractions of the hours is arranged on the periphery of the cylinder in series C′ concentric with the axis of the cylinder, a series of type being provided at suitable intervals endwise of the cylinder. (See Fig. 7.) Spindle c at one end of the cylinder is operatively connected with a clockwork (not shown) in any well-known manner, so that the cylinder will be rotated as required.

To the upper end of frame B and at one side of the latter, as at d, is hinged a frame D, the same comprising side members D′, notched or recessed on the upper side transversely, as at d', the recesses being preferably narrower at the bottom than at the top, with the side walls thereof beveled as shown at d^2, and the recesses of one member D′ alternating with the recesses of the opposite member D′. Between recesses d' members D′ have secured, respectively, springs E. Springs E are preferably flat leaf-springs, (a spring being shown detached in Fig. 8,) and extend transversely of frame D at right angles to the side members thereof, a spring being provided for each series of type of the type-cylinder and directly over the respective series of type of the type-cylinder. The free ends of springs E are located, respectively, directly over a recess d', and extend, respectively, somewhat beyond the respective side members of frame D for the purpose hereinafter made more apparent, and in their normal position the springs are in approximately the same horizontal plane as the upper surface of the side members of frame D. Directly over the axis of the type-cylinder and directly over the respective series of type, springs E are provided with a depending teat, projection, or hammer e.

Frame D at either end is provided with cross-pieces or rods D^2, and mounted upon these cross-pieces is a sliding frame, preferably about half as wide as frame D. This sliding frame comprises side members F, preferably made of sheet metal and connected by cross-pieces F′, side members F being preferably folded, as at f, forming pockets or holders for the paper or card X upon which the time is recorded, and the inked ribbon or carbon-paper Z instrumental in making the record, and members F, preferably at either end, are bent around cross-pieces or rods D^2 of hinged frame D, so as to loosely embrace members D^2 and be adapted to be slid endwise the same.

The relative positions of springs E and

their projection or hammer e with reference to the type-cylinder, printing-card, carbon-paper, or inking-ribbon, &c., is more clearly in Fig. 6.

To the sides of casing A, on the outer surface and extending lengthwise thereof, are secured slotted bars G, (see Figs. 2, 3, and 6,) preferably three in number, and located the one above the other, and it will be observed that the slots g of the respective bars are located diagonally to each other—that is, no two slots are in the same vertical plane, as shown in Fig. 2. The sides of casing A are correspondingly slotted or perforated, (see Fig. 6,) having a slot registering with each slot in the respective bars G aforesaid, and operative vertically within said slots are gravity tilting levers H, respectively, that are substantially the same in construction, being all levers of the first class and fulcrumed to the inner side of the sides of casing A. Plates I, slotted for the passage of levers H, are secured in any suitable manner to the casing and having inwardly-projecting perforated lugs I′ in the same horizontal plane, with preferably a single pin or rod h, extending through the lugs of a plate from end to end of the latter. There are thus three rows of levers on either side of the machine, the levers of a row being pivotally mounted on the respective axial pin or rod h in common. The levers of the middle row are provided, respectively, with a nose J, pivoted near the end of the weight-arm of the lever, as at J′, and straddling or embracing the latter, as at J^2, and projecting beyond the end of the respective lever. The levers of the upper and lower rows have pivotally connected therewith, respectively, a lever of the third class H′, the power-arms of these levers being pivotally connected to the weight-arm and the latter being located in the same plane with the weight-arm of levers H of the middle row, lever H′, as shown, being preferably fulcrumed in the same horizontal plane with levers H upon the same axial pin or rod. The weight-arm of levers H′, like the weight-arm of levers H of the middle row, have pivotally connected therewith a nose, substantially the same as nose J, already described.

Plates G have forwardly-projecting arms K, that terminate, respectively, in a depending bifurcated or slotted member K′, and the power-arms of levers H extend outside casing A through the slot in the respective members K′, and forward of the latter, where they can be manipulated.

The cross-pieces F′ of the sliding frame, hereinbefore described, are provided on their under surface with teeth f', constituting racks that are adapted to be engaged by a toothed sector L, pivoted, as at l, to the respective upright supporting-frames B. Each sector L has an arm L′, that is adapted to be actuated by a cam N, mounted on spindle c at the respective end of the type-cylinder.

By the mechanism just described it will be observed that the sliding frame is moved at right angles to the type-cylinder, thereby causing the card or paper X always to present a blank for receiving the time-record at the different times of the day.

Each workman is provided with a check, as at M, bearing a letter or figure corresponding to the letter or number of the lever that he is to manipulate to record his time, and this check he carries in his pocket before and after working-hours. As the workman arrives at the shop in the morning he slips his check upon the respective lever (the check being perforated for the purpose), and then depresses or moves the lever out of slot in member K′, and slides the check rearward, so that when the lever is released and returns to its normal position the check will come behind member K′. The arrangement of parts is such that the operation of the lever just referred to causes the nose with which the lever is provided, as hereinbefore described, to be elevated and to engage and lift the free end of the adjacent spring E; but as soon as the lever is out of the slot in member K′ the nose will release said spring, the tension of the spring returning the latter with sufficient force so that the free end of the spring will be carried beyond its normal position and descend against the bottom of the respective recess d', causing teat or projection or hammer e of the spring to press the paper or card, upon which the record is to be made, and the carbon-paper or ribbon immediately below it, with sufficient force against the opposing type on the type-cylinder to cause the record of the time to be made. The impression having been made, the tension of the spring returns the latter to its normal position, and the nose for actuating the spring, as aforesaid, being pivotally connected with the lever, will not prevent the return of the latter to its normal position; and it will be observed that by the transverse movement of the sliding frame that carries the paper on which the time-record is made, as aforesaid, which movement is effected by means of sectors L, operated by cams N and engaging the toothed members or racks of said sliding frame, no matter what time during the day the time is recorded, said sliding frame will at all times present a blank portion of the paper for receiving the record.

Although the levers can be made to return to their normal position by gravity, as indicated, springs, as at S, are preferably provided, said springs connecting the levers with some suitable supporting member, such as the inclosing casing, and acting in the direction to return the levers to their normal position.

My improved machine is exceedingly simple in construction, and consequently comparatively inexpensive, and is not liable to get out of order. I would also have it under-

stood that modifications may be made in the details of construction without departing from the spirit and purpose of my invention.

What I claim is—

1. In a workman's time-recorder, a rotating cylindrical type-bearing surface, a frame supported above and extending lengthwise of the axis of said type-bearing surface and having cross-pieces or rods, a sliding frame or carriage mounted on and adapted to slide endwise of said rods or cross-pieces, said sliding frame being adapted to carry the time-record-receiving paper or card and the carbon-paper or inked ribbon instrumental in making the record, and suitable mechanism for pressing said time-record-receiving paper or card and carbon-paper or inked ribbon against the type of tho type-bearing surface aforesaid, substantially as set forth.

2. In a workman's time-recorder, supporting frames or standards and a rotating type-cylinder supported by said frames or standards, a frame extending lengthwise above the cylinder and hinged to said supporting frames or standards, said hinged frame having cross-pieces or rods, a sliding frame or carriage mounted on and adapted to slide endwise said rods or cross-pieces of the hinged frame, said sliding frame being adapted to carry the time-record-receiving paper or card and the carbon-paper or inked ribbon instrumental in making the record, and suitable lever and spring-actuated mechanism for pressing said time-record-receiving paper or card and carbon-paper or inked ribbon against the type on the type-cylinder, substantially as set forth.

3. In a workman's time-recorder, upright supporting frames or standards and a rotating type-cylinder supported by said frames or standards, a frame mounted on or connecting the supporting frames or standards above the cylinder and provided with cross-pieces or rods, a sliding frame or carriage mounted on and adapted to slide endwise said rods or cross-pieces, the side members of the sliding frame being bent or folded to form holders for carrying the time-record-receiving paper or card and the carbon-paper or inking-ribbon instrumental in making the record, and suitable lever and spring-actuated mechanism for pressing the time-record-receiving paper or card and carbon-paper and inking-ribbon against the type on the type-cylinder, substantially as set forth.

4. In a workman's time-recorder, an inclosing casing, a rotating type-cylinder supported within said casing, and the type of the cylinder being arranged in series substantially as shown and described, a frame, as at D, supported above the type-cylinder, a sliding frame or carriage supported by frame D and adapted to move crosswise of the same and carry the time-record-receiving paper or card and the carbon-paper or inking-ribbon instrumental in making the record, a spring, as at E, for each series of the type of the type-cylinder, said springs being connected with and arranged transversely of frame D, and having, respectively, a depending teat, projection, or hammer adapted to press the time-record-receiving paper or card and inking-ribbon or carbon-paper against the type of the respective series of type of the type-cylinder, and levers pivotally connected with the inclosing casing and adapted to be manipulated from outside the casing, and a nose or projecting member, as at J, pivotally connected with the inner end of said levers and adapted to engage and lift the free end of one of the springs aforesaid, substantially as set forth.

5. In a workman's time-recorder, an inclosing casing and a rotating cylinder supported within the casing and bearing type arranged substantially as indicated, a hinged frame supported above the type-cylinder, and a sliding frame or carriage supported by said hinged frame and adapted to be moved crosswise of the cylinder and carry the time-record-receiving paper or card and the carbon-paper or inking-ribbon instrumental in making the record, the side members of the hinged frame having depressions or recesses with the recesses in one side member alternating with the recesses in the other side member, horizontal or approximately horizontal leaf-springs secured to one of the respective side members of the hinged frame between said depressions or recesses and extending transversely of the frame, the free ends of said springs being adapted to be depressed into a recess of and extending beyond the opposite side member of said hinged frame, the springs having, respectively, a depending projection or hammer, and mechanism, substantially as indicated, for lifting the free ends of said springs, substantially as and for the purpose set forth.

6. In a workman's time-recorder, an inclosing casing, a rotating cylinder supported within said casing and bearing type arranged substantially as indicated, a hinged frame supported above the type-cylinder and a sliding frame or carriage supported by said hinged frame and adapted to move crosswise of the cylinder and carry the time-record-receiving paper or card and the carbon-paper or inking-ribbon instrumental in making the record, the side members of the hinged frame having depressions or recesses with the recesses in one side member alternating with the recesses in the other side member, horizontal or approximately-horizontal leaf-springs secured to one of the respective side members of the hinged frame between said depressions or recesses and extending transversely of the frame, the free ends of said springs being adapted to be depressed into a recess of and extending beyond the opposite side member of said hinged frame, the springs having a depending projection or hammer, respectively, three rows of levers pivoted at each side of the inclosing casing with the arrangement of levers, substantially as indi-

cated, and suitable means operatively connected with the levers and adapted to engage and lift the free end of the springs aforesaid, substantially as and for the purpose set forth.

7. In a workman's time-recorder, an inclosing casing, a rotating cylinder bearing series of type arranged substantially as indicated, a frame, as at D, supported above the type-cylinder and a sliding frame or carriage supported by frame D and adapted to move at right angles to the axis of the type-cylinder and carry the time-record-receiving paper or card and the carbon-paper or inking-ribbon instrumental in making the record, a spring, as at E, for each series of type on the type-cylinder, said springs being connected with and arranged transversely of frame D, and having, respectively, a depending teat, projection, or hammer, as at *e*, mechanism, substantially as indicated, for lifting the free ends of said springs to actuate the hammers, and a spring connected with said hammer-actuating mechanism and acting in the direction to return said mechanism to its normal position, substantially as and for the purpose set forth.

8. In a workman's time-recorder, a rotating type-cylinder bearing series of type arranged on the periphery of the cylinder, a frame or carriage located above and lengthwise of said cylinder and adapted to slide crosswise of the cylinder, said sliding frame carrying the time-record-receiving paper or card and the carbon-paper or ribbon instrumental in making the record, suitable lever and spring-actuated mechanism for each series of type and adapted to press the time-record-receiving paper or card and carbon-paper or inking-ribbon against the type of the respective series of type of the type-cylinder, and arms, as at K, projecting outwardly from the sides of the inclosing casing and having, respectively, a depending member, as at K′, provided with a slot adapted to be engaged by an arm or member of the lever mechanism aforesaid, substantially as and for the purpose set forth.

9. In a workman's time-recorder, supporting frames or standards, a rotating spindle mounted in said frames or standards and a type-cylinder mounted on the spindle, a frame or carriage supported above and extending lengthwise of the cylinder, said frame or carriage being adapted to hold the time-record-receiving paper or card and the carbon-paper or ribbon instrumental in making the record, the cross-pieces at either end of said frame being provided with teeth, a sector pivotally connecting with the supporting-frame at either end of the cylinder, and suitable means for operatively connecting said sector with the rotating spindle, substantially as and for the purpose set forth.

10. In a workman's time-recorder, supporting frames or standards, a rotating spindle mounted in said frames or standards and a type-cylinder mounted on the spindle, a frame or carriage supported above and extending lengthwise of the cylinder, said frame or carriage being adapted to hold the time-record-receiving paper or card and the carbon-paper or ribbon instrumental in making the record, the cross-pieces at either end of said frame being provided with teeth, a sector pivotally connected with the supporting-frame at either end of the cylinder, and a cam mounted on the rotating spindle aforesaid at either end of the cylinder, said sector having a depending arm or member adapted to be engaged and actuated by the respective cam, substantially as and for the purpose set forth.

In testimony whereof I sign this specification, in the presence of two witnesses, this 13th day of November, 1891.

REUBEN D. MORGAN.

Witnesses:
C. H. DORER,
WARD HOOVER.

(No Model.)

3 Sheets—Sheet 1.

F. TERSTEGEN.

TIMEPIECE REPEATING MECHANISM.

No. 487,399. Patented Dec. 6, 1892.

Fig. 1.

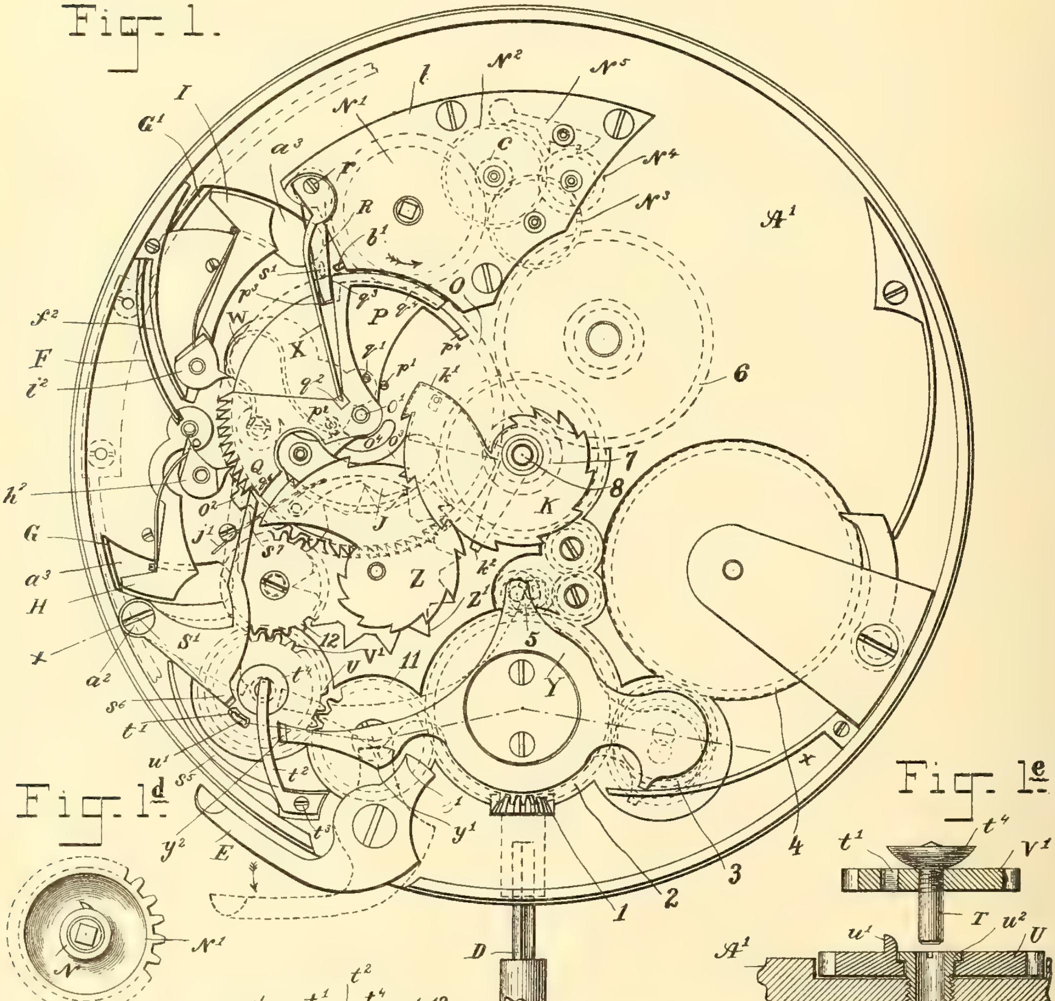


Fig. 1d

Fig. 1e

Fig. 1a

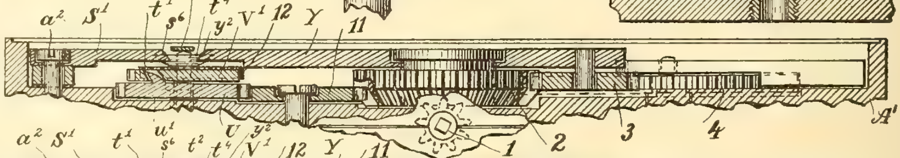


Fig. 1b

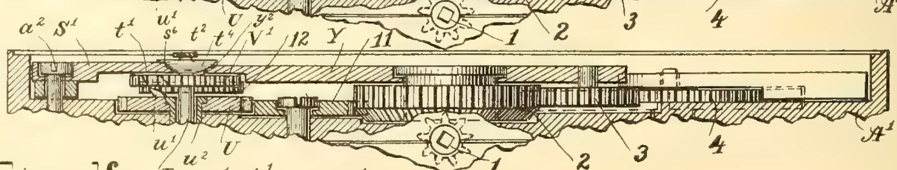
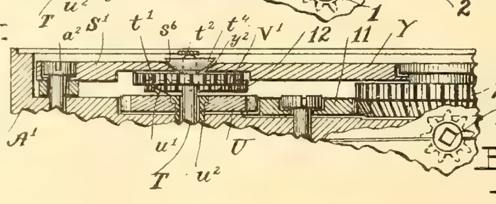


Fig. 1c



Witnesses.
John F. Nelson
Anton J. Habermehl

Inventor.
Fred Terstegen
By [illegible]
Att'y.

(No Model.) 3 Sheets—Sheet 2.

F. TERSTEGEN.

TIMEPIECE REPEATING MECHANISM.

No. 487,399. Patented Dec. 6, 1892.

Fig. 2.

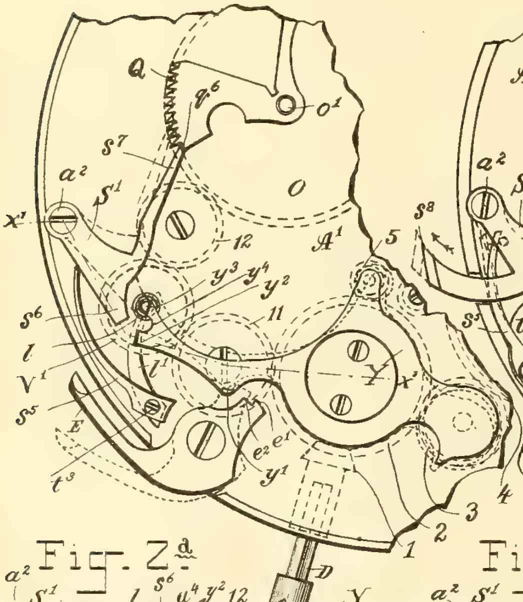


Fig. 3.

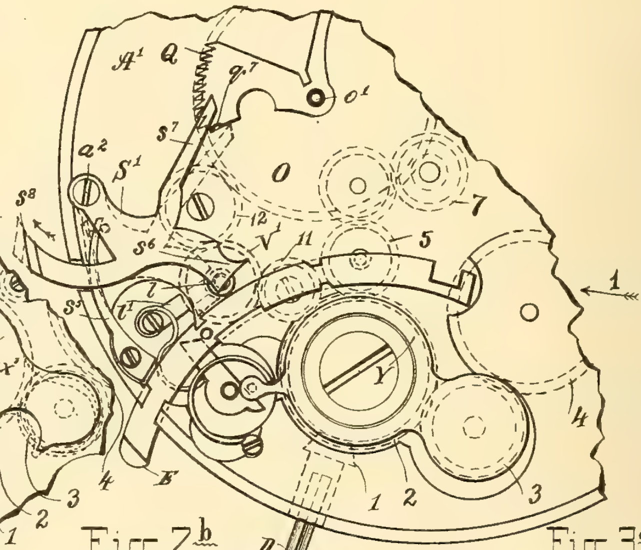


Fig. 2a.

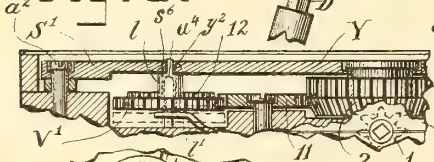


Fig. 2b.

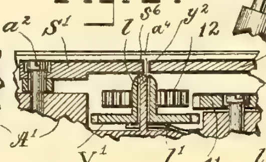


Fig. 3a.

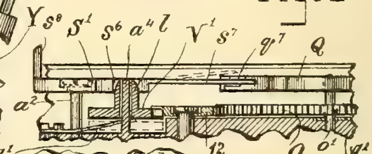


Fig. 4.

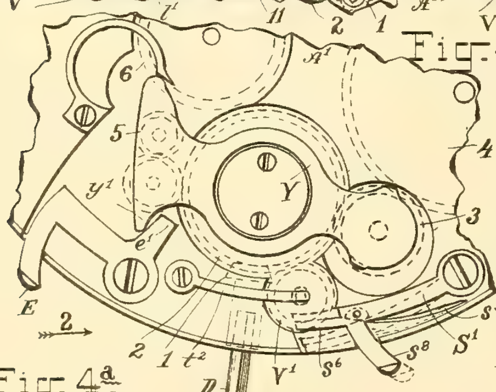


Fig. 5.

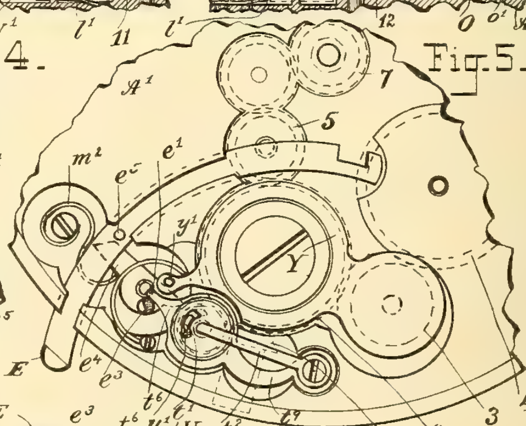


Fig. 4a.

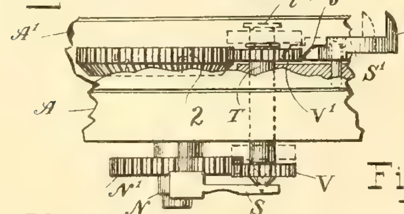


Fig. 5a.

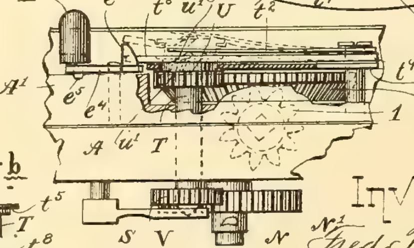
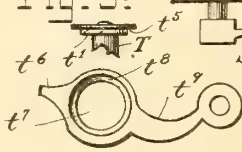


Fig. 5b.



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(No Model.) 3 Sheets—Sheet 3.

F. TERSTEGEN.

TIMEPIECE REPEATING MECHANISM.

No. 487,399. Patented Dec. 6, 1892.

Fig. 6.

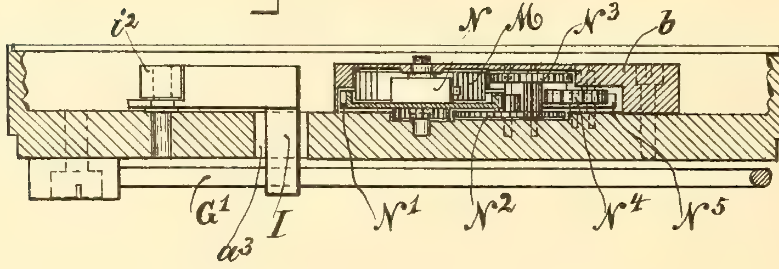
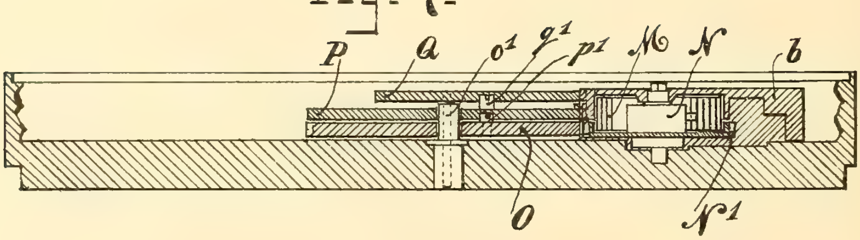


Fig. 7.



WITNESSES:

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Chas. E. Peters

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BY Felton E. Down

ATTORNEY.

THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

FRED TERSTEGEN, OF ELIZABETH, NEW JERSEY.

TIMEPIECE REPEATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 487,399, dated December 6, 1892.

Application filed April 5, 1890. Serial No. 346,781. (No model.)

To all whom it may concern:

Be it known that I, FRED TERSTEGEN, of Elizabeth, in the county of Union and State of New Jersey, have invented a new and useful Repeating Mechanism for Watches and other Timepieces, of which the following is a specification.

This invention relates to improvements in the construction of repeating mechanism for watches and other timepieces and to the arrangement of the said mechanism on the front plate of the watch under the dial, and also to setting the repeating mechanism to strike the time by means of a winding-pinion and a train of gearing operated by said pinion.

In my application bearing even date herewith, Serial No. 346,780, I have shown and described a repeating mechanism in which the repeater-setting lever is set by suitable gearing connecting it with the winding-stem and arranged to break the connection between the repeater-motor and the stem-driven train by the action of the winding-stem. In my present invention the repeater-setting lever is operated by the repeater mechanism automatically to disconnect the stem-driven train from the repeater-motor. Furthermore, in my present invention mechanism is described and shown whereby the repeating mechanism can be disconnected from the stem-driven train positively by a repeater-setting device provided with a finger which is adapted to be actuated by the finger of the operator.

My invention consists of a repeating mechanism so arranged that the same may be arranged to break the connection of the gearing between the winding-pinion and a repeater-motor for actuating the same when the repeating mechanism is set to a striking position.

My invention further consists of a system of gearing for actuating a repeater-motor and connected with a winding-pinion which operates a system of gearing for actuating the time-motor, said gearing for actuating the repeater-motor being breakable automatically or positively between the winding-pinion and the repeater-motor to prevent the repeating mechanism from being stopped inadvertently.

My invention also consists of a system of gearing for actuating a repeater-motor so arranged that the same is connectable automatically or positively with the winding-train that operates the gearing for actuating the time-motor.

My invention further consists of devices by which the connection of the said gearing for actuating a repeater-motor can be broken or by which the same can be connected with the winding-train that operates the gearing for actuating the time-motor.

My invention further consists in special gearing interposed between a repeater-motor and a winding-pinion and of mechanism for setting the stem-driven train into its hand-setting position, by which the motion of the winding-train is communicated to the dial-wheels, said mechanism being also adapted to interrupt the communication between the winding-train and the dial-wheels when the winding-train is in connection with said motor, and when the said mechanism is set so that the motion of the winding-pinion is communicated to the dial-wheels said mechanism breaks the continuity of the said gearing between the winding-pinion and the repeater-motor.

My invention further consists in details of improvement and combination of parts that will be more fully hereinafter set forth.

In the accompanying drawings, Sheet I represents my improved repeating mechanism and gearing for winding the motor-spring of the same connected with the winding-pinion of a watch and which is actuated thereby. Figure 1 being a face view of a watch, showing my improved repeating mechanism and the gearing for the motor-spring of the same connected with the winding-pinion of the watch and which is operated thereby independently of the gearing of the time-motor; also showing the device S′ for disconnecting the said gearing from the winding-train operated by the repeating mechanism, also illustrating by dotted lines the said device when the same is operated for disconnecting the said gearing from the winding-train when the repeating mechanism is released, also showing the yoke-lever E, which is used for setting the yoke and the stem-driven train to the hand-setting position, and showing by dotted lines the said position of the yoke, whereby the same disconnects the gearing of the repeater-motor from the winding-train. Fig. 1ª is a cross-section on the line $x\,x$, show-

ing the clutch devices engaged by which the gearing of the repeater-motor is connected with the winding-train. Fig. 1^b is a similar view to Fig. 1^a, showing the clutch devices disconnected by the yoke when the same has been set to its hand-setting position by the yoke-lever E and moved to disconnect the gearing of the repeater-motor from the winding-train when the hands are set. Fig. 1^c is a similar view to Fig. 1^a, showing the clutch devices disconnected by the setting device S′ when the same has been moved to disconnect the gearing of the repeater-motor from the winding-train when the repeating mechanism is being released. Fig. 1^d is the arbor-wheel for the motor-spring of the repeating mechanism detached and enlarged. Fig. 1^e is an enlarged view of the clutch devices, partly in section.

Sheet II represents my improved gearing for the repeater-motor and illustrating various ways by which the said gearing may be connected with and disconnected from the winding-train of a watch, Fig. 2 being a face view of a part of the watch, showing the yoke-lever E, the yoke, and the shiftable wheel V′, and a modification of the device for disconnecting the gearing of the repeating mechanism, also showing the gearing of the repeater-motor disconnected from the winding-train by the yoke, also showing the modified yoke-lever with its step e^2 and illustrating by dotted lines the position of the yoke when the same has been set by the yoke-lever and its step e^2 to connect the gearing of the repeater-motor by the shiftable wheel V′ with the winding-train when the said yoke, with its incut y^4, is set in line with the hub of the wheel V′, which is shifted in gear with the winding-train by a spring, and also showing the setting device S′, as described in connection with Fig. 1. Fig. 2^a is a cross-section on line x' x', Fig. 2, showing the shiftable wheel V′ connected with the winding-train and with the gearing of the repeater-motor when the yoke has been set with its incut y^4 in line with the hub of the said wheel. Fig. 2^b is a similar view of a part of the mechanism shown in Fig. 2^a, showing the shiftable wheel V′ disconnected from the gearing of the repeater-motor and from the winding-train by the setting device S′ when the repeating mechanism or its striking-rack is being released, and also illustrating the shiftable wheel V′ disconnected from the gearing by the yoke Y when the same is moved into its setting and winding position. Fig. 3 represents a face view of a part of a watch, showing a stem-driven train of well-known construction, representing a stem-winding and lever-setting mechanism of an "Elgin" watch and showing my improved gearing of the repeater-motor applied thereto and the same disconnected from the winding-train by the setting device S′ and showing the setting device S′ modified. Fig. 3^a is a sectional elevation of Fig. 3 from the direction of the arrow 1, showing the shiftable wheel V′ brought into engagement with the gearing of the repeater-motor when the setting device S′ is moved by the finger of an operator, so that its part s^7 is set behind the edge of the striking-rack, whereby its part s^6 is brought out of line with the hub of the shiftable wheel V′, which is set by its spring in gear with the gearing of the repeater-motor, the position of the said setting device being illustrated by the dotted lines in Fig. 3. Fig. 4 is a face view of a part of a watch and representing a stem-winding and lever-setting mechanism of a "Waltham" watch and my improved gearing of the repeater-motor applied thereto modified and in connection with the repeater-motor applied on the back of the watch-movement, as fully shown and described in my application for patent bearing even date herewith, and the gearing of the repeater-motor disconnected from the winding-train and the setting device S′ modified, and also illustrating the position of the setting device S′ in dotted lines when the same is moved by the finger of an operator, whereby the same connects the gearing of the repeater-motor with the winding-train. Fig. 4^a is a sectional elevation of Fig. 4 from the direction of arrow 2, showing the setting device moved to the connecting position of the gearing of the repeater-motor with the winding-train, also showing the repeater-gearing connected with the actuating-wheel of the repeater-motor placed on the back of the watch, and also showing in dotted lines the position of the gearing of the repeater-motor when set out of connection with the winding-train. Fig. 5 represents a face view of a part of a watch and illustrating a stem-winding and lever-setting mechanism of an Elgin watch similar to Fig. 3 and my improved gearing of the repeater-motor applied thereto, the wheel of the said motor being placed on the back of a watch, as shown in Fig. 4^a, showing the gearing of the repeater-motor connected with the winding-train and the yoke-lever mechanism modified by which the gearing of the repeater-motor is disconnected when the same is moved to its hand-setting position. Fig. 5^a is a side view from the direction of the winding-pinion of a portion of the watch, showing the location and arrangement of the gearing of the repeater-motor connected with the winding-train and showing by dotted lines the position of the spring-bar t^9 when the yoke-lever is being moved to its hand-setting position, illustrating by dotted lines the disconnection of the clutch devices of the gearing of the repeater-motor and its connection with the winding-train broken. Fig. 5^b is a view of the spring-bar t^9 and the clutch device detached from the watch-plate. Fig. 6 represents a sectional view of the repeating-mechanism bridge and the plate A′, showing the position of the striking-hammer and its construction and also illustrating the moderating-gear. Fig. 7 is a similar view

showing the motor and arbor-wheel N′ in gear with the driving-wheel O for operating the striking-racks P and Q.

Similar letters and figures of reference indicate corresponding parts.

A winding-stem D is connected suitably with a winding pinion or wheel 1 of a watch. The said pinion engages a crown-wheel 2, placed under a yoke Y, pivoted to the watch-plate A′ and held in place by a cap and screws, as usual. At one end of the yoke is pivoted an intermediate winding-wheel 3, engaging the barrel-arbor wheel 4 when the yoke is in its winding position.

5 is the intermediate setting-wheel for transmitting the motion of the crown-wheel to the dial-wheels when the yoke is in its setting position.

6 is the minute-wheel, and 7 the cannon-pinion placed on the center-post 8, suitable wheels being shown that connect the setting-wheel 5 with the cannon-pinion 7, and which are called the "dial-wheels."

The above-described mechanism of a stem winding and setting watch is of well-known construction and does not differ in operation from similar mechanism found in other watches, except as modified in the manner hereinafter described by the mechanism and modes of operation peculiar to my invention.

I will now describe in detail my novel devices for operating a repeating mechanism by means of a winding-pinion forming part of a stem-driven train of a watch. The winding pinion or wheel 1 engages a wheel 2, which engages a gear-wheel 11, which is pivoted in a suitable depression or seat in the watch-plate A′ and held in place by a screw and forms here part of the stem-driven train. A gear-wheel U, engaging the wheel 11 and turned thereby, is pivoted in a depression or seat in the watch-plate A′ and held in place by a hollow screw u^2, as shown in detail in Fig. 1^e. The wheel U is provided with a ratchet-tooth u', projecting from its upper side near its center hole. A shiftable wheel V′, having on its upper side a head or rim t^4 and on its under side an arbor or staff T, is set upon the wheel U, and its arbor is placed in the hollow screw or stud u^2, so as to shift up and down within the same. The wheel V′ is provided with a diagonal oblong hole or incut t', of which one edge on its under side is rounded off or beveled down and the other under edge of the hole t' is sharpened, and the said wheel V′ rests upon the wheel U in such a manner that the said ratchet-tooth u' engages into the hole t' of the wheel V′ and bears against its sharp edge, so as to form a coupling or clutch device whereby the wheel U can turn the wheel V′. A suitable spring t^2 presses by its free end upon the head t^4 on the shiftable wheel V′ to keep one of the coupling devices engaged with the other coupling device. The wheel U is turned by the crown-wheel 2 in either direction by the winding-pinion and stem-arbor. The arrangement of the parts is such that when the crown-wheel is turned by the winding-pinion and stem to the right the shiftable wheel V′ is unlocked or disengaged from the wheel U and the motion of the stem-driven train is transmitted to the wheel 4, which winds the motor-spring of the time mechanism; but by turning the winding-pinion by the stem-arbor to the left or reverse direction the motion of the same is transmitted by the wheel U to the wheel V′ by its clutch device u' engaging and locking the clutch device t' of the wheel V′. The wheel V′ engages a wheel 12, pivoted to the plate A′ and in engagement with the wheel O, which engages the wheel N′ for actuating the motor-spring of the repeating mechanism.

The clutch devices of the wheels U and V′ can be connected and disconnected by a setting device S′, as will be described hereinafter, or by mechanism connected with the yoke-lever E, which is for the purpose of setting the stem-driven train in connection with the dial-wheels. The yoke Y, which is provided with a projection or arm y^2 and beveled at its end, is moved by the said yoke-lever in contact with and under the head or rim t^4 of the shiftable wheel V′. The said head t^4 of the wheel V′ is arranged so that its top is larger in proportion to its bottom, so as to form a rim which is beveled or rounded off, and under the said beveled rim t^4 the beveled arm y^2 of the yoke operates.

The operation is as follows: The yoke-lever E being moved in the direction of the arrow, its arm e' comes in contact with the projection y' of the yoke Y, which is turned thereby until the arm e' of the yoke-lever is pressed against and onto the said projection of the yoke, as shown in dotted lines in Fig. 1, and the said yoke is thereby moved to the position shown in dotted lines, in which position the wheel 3 on the yoke is disconnected from the winding-wheel 4 of the time-motor and the wheel 5 is connected with the dial-wheels, and the yoke, with its arm y^2, is set under the beveled rim t^4 of the shiftable wheel V′, thereby lifting or moving the wheel V′ out of connection with the clutch device of the wheel U, as shown by the dotted lines in Fig. 1 and shown in Fig. 1^b. The stem-driven train can now be operated for setting the dial-wheels, and as the wheel V′ is disconnected from the stem-driven train the gearing of the repeater-motor cannot be actuated and the dial-wheels may be set forward or backward without interfering with the repeating mechanism. By pushing the yoke-lever E back to its initial position the yoke Y is turned back to its winding position by a suitable yoke-spring, and the wheel V′, being released by the projection y^2 of the yoke passing from under the rim t^4, is pressed against the wheel U by its spring t^2, as shown in Figs. 1 and 1^a, whereby its clutch device t' is moved into position to engage the clutch device u'. The wheel V′ now engages the wheel 12, which is in engagement with wheel O, placed on a stud o', at-

tached to the watch-plate, and which engages the wheel N′, provided with a winding-arbor N for winding the motor-spring, placed in a seat arranged on the underside of the bridge b. The bridge b is fastened by suitable screws to the watch-plate A′. Between the bridge b and the said plate the moderating-gear or regulating-wheels are placed—viz., the wheel N′, which is partly turned out on its upper side to form a depression or seat for a motor-spring M, as shown in detail in Fig. 1^d and Figs. 6 and 7. The said wheel gears with a pinion c, connected with a wheel N^2. On the pinion c a ratchet-wheel is attached, engaged by a click controlled by a click-spring and fastened to wheel N^2 and operates in the usual manner, but not shown in the drawings, as it is fully illustrated and described in my application for patent bearing even date herewith, Serial No. 346,780. The wheel N^2 gears with a pinion attached to wheel N^3, which in turn gears with a pinion attached to wheel N^4 or escape-wheel with which the escapement N^5 engages, as shown in dotted lines, Fig. 1.

The mechanism for transmitting motion from the motor-spring to the racks and hammers consists of the wheel O, engaged by wheel N′. The said wheel O is provided with a catch p', bearing against the edge of the hour-striking rack P, placed above or on the wheel O and is moved by the same. The wheel is provided with an opening o^3, giving place for the seconds-hand staff, which passes through the same. The hour-rack P is provided with a pin or shoulder p^2 near its center, projecting downwardly through an opening o^4, provided for it in the wheel O, and the rack P through the said pin is engaged by the rack-spring W, placed under the wheel O. This rack-spring is for the purpose of setting the hour-rack with its snail-piece p^4 against the snail Z. A rack Q is placed above or on the hour-rack P and moved by the catch q', attached to the rack P, as shown. The rack Q is provided with a shoulder q^2 near its center, engaged by the rack-spring X, which serves for holding the racks and wheel O down in place against the watch-plate A′, and is also for the purpose of setting the rack Q with its snail-piece q^4 against the snail K. The snail K is attached to the cannon-pinion 7, placed on the center post 8, forming part of the time-train of the watch. In connection with the snail K the arm k^2 of the surprise k' at the full hour turns one tooth of the star-wheel Z′ forward. On the star-wheel the jumper J acts by its spring j' as usual in repeaters.

The hour-rack P is provided with an incut p^3, which forms a seat for the releasing device R, pivoted at r to the watch-plate and under the bridge b. A pin b', attached to the bridge b and having its end or point beveled down, projects toward the releasing device R. The releasing device is formed as a flat spring, which is provided with a pin or suitable finger s', forming a stop-finger which projects downwardly from the releasing device and in line with a projection or guide device o^2 of the wheel O. The said guide device o^2 is for the purpose of setting and pressing the releasing device R by its stop-finger s' against and upon or over the pin b' on the bridge b, thereby bending or lifting the end of the releasing device out of and away from the incut p^3 of the rack P to release the striking-racks and also for the purpose of stopping the winding of the stem-driven train, so that the repeater-motor spring cannot be overwound or broken.

A device S′, which I will call the "setting device," is pivoted to the watch-plate at a^2 and is in connection with a spring s^5, attached to the plate at t^3. The setting device S′ is provided with two projections or arms. The longest arm s^7 is engaged by the striking-rack Q, which holds the short beveled arm s^6 of the setting device S′ away from the beveled rim t^4 of the shiftable wheel V′, as shown in Fig. 1, when the repeating mechanism is in its normal or initial position. The said beveled arm s^6 of the setting device S′ is intended to be moved against and under the beveled rim t^4 of the shiftable wheel V′ for setting the same out of connection with the clutch device of the wheel U.

The operation is as follows: When the winding-stem D turns the winding-pinion 1, crown-wheel 2, wheel 11, wheel U, engaging by its clutch device the wheel V′, wheel 12, and wheel O, engaging the motor-wheel N′, the said wheel N′ is turned in the direction of the arrow shown on bridge b in Fig. 1 until the projection or guide device o^2 of the wheel O comes in contact with the pin or stop-finger s' of the releasing device R, thereby turning and pressing the releasing device against and upon or over the pin b' against the bridge b and also stopping the further winding of the stem-driven train and setting or bending the releasing device R out of engagement with the rack P. The rack P, being set free, is turned by its spring W against the hour-snail Z and the rack Q by its spring X against the snail K or into their striking position. The arm s^7 of the setting device S′ being set free by the repeating mechanism and the rack Q being released, the setting device S′ is moved by its spring s^5, and its beveled arm s^6 is set under the beveled rim t^4 of the shiftable wheel V′, thereby moving the said wheel V′ and shifting it out of connection with the ratchet-tooth u' of the wheel U, as shown by the dotted lines in Fig. 1 and shown in Fig. 1^c, thereby automatically disconnecting the wheel V′ from the stem-driven train. The motor-spring moves the wheel N′, engaging the moderating-gear, and now moves back the wheel O, and its catch p' comes in contact with the rack P, turning the same back, and its rack-teeth, engaging the hammer-tooth h^2, operates the hammer H, which by its spring F is forced against the gong-spring G. The hour-rack P on its return motion by means of its catch q' comes

in contact with the rack Q and, turning the same back, its rack-teeth engaging the hammer-tooth i^2, operates the hammer I, which by its spring f^2 is forced against the gong-spring G′, and when the last stroke is made the rack Q by the edge q^3 comes in contact with the releasing device R, resting upon the pin b' on the bridge b, and turns and pushes the releasing device backward and from the said pin, whereby the releasing device springs back into the incut or seat p^3 of the rack P again. At the same time the end or edge q^6 of the rack Q comes in contact with the arm s^7 of the setting device S′ and turns the same back, whereby its beveled arm s^6 is moved away from under the beveled rim t^4 of the shiftable wheel V′ in the position as shown in Fig. 1, and the shiftable wheel is pressed back again in contact with the ratchet-tooth u' of wheel U by the spring t^2, (as shown in Fig. 1ª,) thereby automatically connecting the gearing of the repeater-motor spring with the stem-driven train.

The hammers are operated by their hammer-teeth as usual in repeaters. The hammers are shown pivoted to the front of plate A′, and the head of each hammer is suitably formed so as to project through a suitable opening a^3, provided for it in the front plate in position to strike the gong-spring on the other or under side of the front plate A′, to which the said gong-springs are attached, as shown by the dotted lines.

The connecting of the gearing of a repeater-motor with the winding-train of a watch can be done in various ways, as well as disconnecting it therefrom. For instance, in Sheet II, Fig. 2, the shiftable wheel V′ engages and disengages the winding-train in the following manner: The shiftable wheel V′ is provided with a hub l, the top of which is beveled or rounded off, as shown in Figs. 2ª and 2ᵇ, and is placed on a post or stud a^4, attached to the watch-plate. A suitable spring l', attached to the watch-plate at t^3, as shown in Fig. 2, presses against the under side of the said wheel V′. Above the wheel V′ is an arm of the yoke Y, provided with a projection y^2 and a projection y^3, divided by an incut or hole y^4, as shown. The projection y^3 of the yoke bears on the hub l of the shiftable wheel V′ and is in line with the said hub when the yoke and stem-driven train are in the winding position for the time-motor spring, as shown in Fig. 2, and the wheel V′ is pressed or set out of connection with the wheel 12 and wheel 11, and therefore the gearing of the repeater-motor spring is disconnected from the stem-driven train, as shown in Fig. 2ᵇ. The position of the yoke Y is changed by an arm of the yoke-lever E, which arm is provided with two steps e^2 and e', coming in contact with the projection y' of the yoke Y to give two different positions to the same. When the yoke-lever E is turned to the position shown by the dotted lines in Fig. 2, the step e^2 is set or pressed onto the projection y' of the yoke Y, which is moved thereby to the position shown in dotted lines, in which position the wheel 3 on the yoke is disconnected from the winding-wheel 4 of the time-motor and the yoke, with its projection y^3, is set out of line with the hub l of the shiftable wheel V′ and the incut y^4 of the yoke is brought in line the hub of the said wheel, which is pressed and set into the said incut y^4 by its spring l', and thereby in connection with the wheel 11 and wheel 12, as shown in Fig. 2ª, and therefore the gearing of the repeater-motor is connected with the stem-driven train. When the yoke-lever E is turned so that its other step e' is pressed against and onto the projection y' of the yoke, the projection y^2 of the same comes in contact and in line with the hub l of the wheel V′, which is thereby pressed or set out of connection with the wheels 12 and 11, and the wheel V′ is in the same position again as in Fig. 2ᵇ, and therefore the gearing of the repeater-motor is disconnected from the stem-driven train, as the yoke is now in its hand-setting position and the stem-driven train in connection with the dial-wheels for setting the same. When the yoke-lever E is pressed back, the yoke Y is set by a suitable yoke-spring to its winding position and the stem-driven train in gear with the winding-wheel 4 of the time-motor, as usual. The projection y^3 is then resting on top of the shiftable wheel V′ to disconnect the said wheel from the wheels 12 and 11, and is therefore out of connection with the gearing of the repeater-motor, and the stem-driven train can be turned in either direction. When it is desired to make the repeater strike, the yoke-lever E is turned, as before described, so that its step e^2 is pressed onto the projection y' of the yoke Y, thereby moving the yoke with its incut y^4 in line with the hub l of the shiftable wheel V′, which is set by its spring l' in gear with the wheels 11 and 12, and the stem-driven train is thereby connected with the gearing of the repeater-motor, which is actuated thereby.

A setting device S′, controlled by its spring s^5, is used to disconnect the wheel V′ from the stem-driven train when the striking-rack Q is being released, as described in connection with Fig. 1, Sheet I. The short arm s^6 of the setting device S′ is then pressed against and upon the hub l, as shown in dotted lines in Fig. 2, Sheet II, and the wheel V′ is thereby pressed out of connection with the wheels 12 and 11 and is disconnected from the stem-driven train, as shown in Fig. 2ᵇ. When the striking-rack is turned back to its initial position by its motor, it comes in contact with the long arm s^7 of the setting device S′, which is turned thereby and turns its short arm s^6 away and out of engagement with the hub l on the shiftable wheel V′, which is set by its spring l' again in connection with the wheels 11 and 12, thereby again connecting the stem-driven train with the gearing of the repeater-motor, as shown in Fig. 2ª. In case the set-

ting device S′ is not used, when the repeater-motor is wound and the striking-rack released the winding-gear of the repeater-motor remains in connection with the stem-driven train until the yoke-lever E is turned, whereby the yoke Y changes its position, so that either one of the projections y^2 or y^3 is moved upon the hub l of the shiftable wheel V′, thereby pressing the same out of connection with the stem-driven train, as before described. The yoke-lever E, with its step e^2, is for the purpose of permitting the gearing of a repeater-motor to be put in connection with the stem-driven train of a watch.

In Fig. 3 the stem-driven train and its winding and hand-setting arrangement are of well-known construction, and my invention is shown applied thereto. The wheel O, wheels 12 and 11, and the shiftable wheel V′, with its hub l, controlled by its spring l', are the same as described in Fig. 2. The shiftable wheel V′ is set in connection with the stem-driven train by the setting device S′, provided with an arm s^8, which is to be engaged with and actuated by a finger of the operator. The setting device S′ has its long arm s^7, which comes in contact with the striking-rack, formed as a thin flat spring, as shown in Fig. 3ª, which is set by the spring s^5 on the top of the rack Q, and its other arm s^6 rests upon the hub l of wheel V′ to disengage the same from the wheel 12, as shown in Fig. 3 and in dotted lines, Fig. 3ª.

To actuate the repeater-motor and operate the repeating mechanism to strike, the setting-lever S′ by its arm s^8 is turned in the direction of the arrow by the finger of the operator until the spring-arm s^7 of the said lever snaps behind the striking-rack Q and holds the setting-lever S′ in this position, as shown in the dotted lines in Fig. 3 and in full lines in Fig. 3ª, whereby its arm s^6 is moved away and out of line with the hub l of the shiftable wheel V′, which is set by its spring l' in gear with wheel 12, which latter gears in wheel O, and the wheel O is in connection with a winding-gear of a repeater-motor, as before described. When the repeater-motor is being actuated by the stem-driven train and the striking-rack Q is released, the setting-lever S′ is released and is turned back again by the spring s^5 to its first or initial position and the arm s^6 is pressed against and upon the hub l of the shiftable wheel V′, which is thereby pressed and set out of connection with the wheel 12, and the gearing of the repeater-motor is therefore out of connection with the stem-driven train. The striking-rack Q is provided on its end edge with an inclined notch or beveled groove q^7, and when moved back to its initial position by suitable means actuated by the repeater-motor the said beveled groove q^7 comes in line with the point or end of the spring-arm s^7 of the setting-lever S′, and the said spring-arm s^7 is thereby bent on and over the rack Q, as shown in Fig. 3 and in dotted lines in Fig. 3ª; but when the setting-lever S′ is turned by the finger of the operator, as before described, its spring-arm s^7 is turned away from the upper side of the rack Q and snaps behind the said rack and with its end or point rests against the flat edge and behind the beveled groove q^7 on the rack Q, as shown, and in this position of the said setting-lever the connection is effected by the gearing of the repeater-motor with the stem-driven train; but when the rack is released at its striking position then the said gearing is automatically disconnected from the stem-driven train, as before described. In this figure the device for setting the hands is entirely separate from the gearing of the repeater-motor and is of well-known construction, as before stated.

Fig. 4 represents a stem-driven train of well-known construction to which my invention is applied. The shiftable wheel V′ is attached to a sliding arbor T, (shown in Fig. 4ª,) which passes through the watch-plates A′ and A and on its opposite end is provided with a gear-wheel V, which engages the wheel N′ for actuating a motor-spring, as described and shown in my application for patent bearing even date herewith, Serial No. 346,780.

The shiftable wheel V′, placed on one side of the crown-wheel 2 and out of gear with the same, is set in connection with the said wheel by the setting device S′ in the following manner: The setting-lever S′ is provided with an arm s^8, similar to that described in Fig. 3, and with an arm s^6, beveled down on its upper side, as shown. The said setting-lever S′ is moved in the direction of the dotted lines by the finger of the operator until its arm s^6 is moved away from under the shiftable wheel V′, which is then pressed by its spring t^2 in gear with the wheel 2, as shown in the dotted lines in Fig. 4 and in solid lines in Fig. 4ª, and the wheel 2 is thereby connected with the gearing of a repeater-motor, and the arm s^6 of the setting device S′ is locked by bearing against the edge of the wheel V′, as shown. The gearing of the repeater-motor can be disconnected from the said train either by pressing or pushing with the finger the setting-lever S′ inwardly or back again to its initial position, by which operation the part s^6 is pressed under the shiftable wheel V′, which is thereby pressed out of engagement with the wheel 2, as shown in dotted lines in Fig. 4ª and in solid lines in Fig. 4, or the said wheel V′, with its sliding arbor T, can be operated by a special setting device S, which operates entirely independent of the setting device S′, as shown in Fig. 4ª, whereby the sliding arbor is shifted and its wheel V′ disengaged from the wheel 2 by unlocking the setting-lever S′, which is pressed under the wheel V′ by a spring s^5, provided for the same and shown in Fig. 4.

The operation of the special setting device S is fully described and shown in my application for patent bearing even date herewith, Serial No. 346,780. The device for setting the hands is entirely separate from the gearing

of the repeater-motor and is of well-known construction.

Fig. 5 represents a stem-driven train of well-known construction not forming part of this invention, but connected with it or that part of the invention that relates to interrupting the connection between the winding-pinion and the gearing of the repeater-motor. The gearing for the repeater-motor is provided with a locking or clutch device, as described and shown in my application for patent bearing even date herewith, Serial No. 346,780. The said gearing is disconnected from the stem-driven train through the mechanism connected with the yoke-lever E for adjusting the stem-driven train to its hand-setting position and is illustrated in Fig. 5^a. The yoke-lever E is provided with a pin e^5, which comes in contact with a setting-piece e^4, pivoted to the watch-plate and provided with an arm e', which engages the projection y' of the yoke Y and turns the same in the usual manner when the yoke-lever E is drawn out to its setting position. The said parts are old and their operation is well understood. The novel features are illustrated in Figs. 5, 5^a, and 5^b and will now be described. The setting-piece e^4 is provided with a beveled stud e^3, which operates a spring-bar t^9 for shifting the clutch or locking device of the gearing of the repeater-motor and disconnecting the same from the stem-driven train. The spring-bar t^9 is provided with a hole t^7 and a groove t^8 and has a projection t^6, as shown in detail in Fig. 5^b, and through the said hole the arbor T and its clutch device are placed, and its collar t^5 fits into the said groove of the spring-bar, and the said arbor is set and shifted by the said spring-bar when the beveled stud e^3 is placed against and under the projection t^6 of the said spring-bar, which is thereby bent upward, so that the clutch device t' of the arbor T will be disconnected from the clutch device u' of the wheel U, and thereby disconnect the gearing of the repeater-motor from the winding-train, as shown in dotted lines in Fig. 5^a, and the said beveled stud e^3 is set and placed against and under the projection t^6 of the said spring-bar t^9, when the yoke-lever E is drawn out to its setting position. By pushing the yoke-lever E back the setting-piece e^4 is returned to its initial position by a suitable spring m^2 and sets the beveled stud e^3 away and out of engagement with the projection t^6 of the said spring-bar, so that the same snaps back and the arbor, with its clutch device t', is connected again with the clutch device u' of the wheel U by the pressure of the spring t^2, whereby the gearing for the repeater-motor is set in connection with the winding-train, as shown in Fig. 5. Thus it will be seen that the connection of the gearing for transmitting its motion to a motor-spring of a repeating mechanism from a winding-pinion can be arranged to be broken in various ways and that the connecting of the same can be done automatically and separately; also, that the disconnecting of the same can be done automatically by a repeating mechanism or by a yoke-lever E or by a setting device actuated by the finger of the operator.

The connection of the gearing for transmitting the motion to the motor-spring of a repeating mechanism from the winding-pinion can also be arranged to be broken at any suitable point, or one or more wheels may connect with or disconnect from each other, or other suitable coupling devices may be used or other suitable clutch devices, as may be desired. The main object of the said coupling or shiftable gearing is to furnish means by which the motion from a winding-pinion can be transmitted to a motor-spring of a repeating mechanism and that the connection of the gearing between a winding-pinion and the said motor-spring can be broken.

The invention further consists of means whereby the gearing between the winding-pinion and the motor-spring of a repeating mechanism can be connected and the said connecting of the gearing can be actuated, first, automatically by the repeating mechanism provided with a setting device S′ by its part s^7 moving the part s^6, as in Fig. 1, Sheet I, and Fig. 2, Sheet II, and also in Fig. 5, by the setting device S, fully shown and described in my application for patent bearing even date herewith, Serial No. 346,780; second, by a yoke-lever E to be set by the operator, as in Fig. 2, Sheet II, by its step e^2 moving the part y^4, which produces the same result as the parts s^8 and s^6 of a setting device S′, as in the following figures; third, by the setting device S′ to be set by the operator as in Figs. 3 and 4, Sheet II, by its part s^8 moving the part s^6.

The disconnecting of the gearing can be done, first, automatically by the repeating mechanism provided with a setting device S′ by its part s^7 moving the part s^6, as in Fig. 1, Sheet I, Figs. 2 and 3, Sheet II, and in Fig. 5, by a setting device S, fully shown and described in my application for patent bearing even date herewith, Serial No. 346,780; second, by a yoke-lever E to be set back by the operator by its part e^2 moving the part y^3, as in Fig. 2, Sheet II, which produces the same result as the parts s^8 and s^6 of a setting device S′; third, by a setting device S′ to be set back by the operator by its part s^8 moving the part s^6, but can also be arranged to be disconnected automatically by using a setting device S, as shown in Fig. 4^a, Sheet II, which operates separately from the setting device S′, as described. The disconnecting of the said gearing is also produced by suitable mechanism connected with a yoke-lever when the same is moved to set the stem-driven train to its hand-setting position, as shown in Figs. 1 and 1^b, Sheet I, and described in Figs. 2 and 5, Sheet II.

The bridge b, with its pin b', the releasing device R, racks P Q, winding-wheel O, with its guide device o^2, operating setting device S,

and the sliding arbor T are described and shown in my application bearing even date herewith for repeating mechanism for watches and other timepieces, Serial No. 346,780, and are not claimed, broadly, herein.

I claim—

1. In a watch or other timepiece, the combination of separate motor-springs for operating a repeating mechanism and a time mechanism, a winding-pinion for actuating the said motor-springs, gearing for transmitting the motion of the said pinion to the time-motor, and gearing for transmitting the motion of the said pinion to the repeater-motor, the connection between the said pinion and the transmitting-gearing of the said repeater-motor spring being breakable automatically or positively, substantially as specified.

2. In a watch or other timepiece, the combination of a stem-arbor suitably connected with a winding-pinion for actuating separate motor-springs, gearing for transmitting the motion of the said pinion to a time-motor, and gearing for transmitting the motion of the said pinion to a repeater-motor, the gearing between the said pinion and the repeater-motor spring being connectible automatically or positively, so that the said motor-spring can be actuated by the said pinion, substantially as specified.

3. In a watch or other timepiece having a winding-pinion and wheel 2 for transmitting the motion to a gearing for actuating a time-motor, the combination, with the wheel 2, of suitable gearing for actuating a repeater-motor, the said gearing adapted to be connected with and disconnected from the wheel 2, substantially as specified.

4. The combination, with a time-motor and a stem-driven train to wind the same, of a separate repeater-motor and suitable gearing interposed between the repeater-motor and the stem-driven train, the said gearing adapted to be brought in and out of connection with the stem-driven train, substantially as specified.

5. The combination, with a front plate of a watch, of gearing for actuating a time-motor spring, and suitable gearing for actuating a repeater-motor spring, both sets of gearing being placed on the front plate of the watch, and a stem-winding pinion for actuating both sets of gearing, substantially as specified.

6. The combination, in a repeating-watch, of a shiftable setting-wheel that is movable in and out of gear with a dial-wheel, a winding-pinion, gearing for operating the setting-wheel, gearing for transmitting the motion of the said pinion to a time-motor spring, and gearing interposed between the said pinion and a repeater-motor spring independent of the time-motor spring, a shiftable wheel of the said gearing for transmitting the motion of the winding-pinion to the said repeater-motor spring and adapted to break the connection between the winding-pinion and the repeater-motor spring when the motion of the said pinion is transferred to the dial-wheels, substantially as described.

7. In a repeating-watch, the combination of a motor-spring of a repeating mechanism independent of the time-motor spring, a winding pinion, and suitable gearing for transmitting the motion of the same to the repeater-motor spring, the connection between the said pinion and the transmitting gearing of the repeater-motor spring being breakable by mechanism operated by a device for setting the stem-driven train to its hand-setting position when the pinion is in connection with the dial-wheels, substantially as specified.

8. In a watch having a stem-driven train and suitable gearing for actuating a motor-spring of a repeating mechanism connected with the said stem-driven train, the combination of a yoke-lever and a spring-bar adapted to disconnect the said gearing of the repeater-motor spring from the stem-driven train by suitable mechanism connected with the said yoke-lever when the same is set to its hand-setting position, substantially as specified.

9. In a watch, the combination, with a winding-pinion and suitable gearing for actuating a motor-spring of a time mechanism and a separate motor-spring of a repeating mechanism, of special gearing for transmitting motion to the said motor-spring and a suitable setting device, said special gearing adapted to be set in connection with the said pinion by said setting device, substantially as specified.

10. In a watch, the combination, with a winding-pinion, wheel 2, and gearing that actuates a motor-spring of a time mechanism, of special gearing for actuating a separate motor-spring of a repeating mechanism and a suitable setting device, said special gearing adapted to be connected with the said wheel 2 by said setting device, substantially as specified.

11. In a watch having a stem-driven train for actuating a motor-spring of a time mechanism, the combination, with the stem-driven train, of special gearing for actuating a separate motor-spring of a repeating mechanism and a suitable setting device, said special gearing adapted to be connected with the stem-driven train by said setting device, substantially as specified.

12. A setting-lever for a repeating mechanism, provided with an arm s^8 and an arm s^6, in combination with a special gearing of a motor-spring, of a repeating mechanism and a stem-driven train, substantially as specified.

13. The combination of a yoke-lever having its arm set in contact with a yoke to set the stem-driven train out of gear with the time-motor spring, a yoke, a stem-driven train, and interposed gearing for actuating a repeating mechanism, the said gearing adapted to be set in connection with the stem-driven train by moving the said yoke-lever in contact with the said yoke, substantially as specified.

14. In a repeating-watch, the combination

of a repeating mechanism, a stem-driven train, a repeater-motor spring, and gearing interposed between the stem-driven train and the said repeater-motor, a shiftable wheel of the said gearing adapted to transmit the motion of the stem-driven train to the repeater-motor, and a device operated by the said repeating mechanism that connects the shiftable wheel automatically with the gearing of the repeater-motor and the stem-driven train, substantially as specified.

15. The combination of a stem-driven train, a repeater-motor spring, and suitable gearing for transmitting the motion of the stem-driven train to the said motor-spring, a repeating mechanism, and a suitable device operated thereby for disconnecting the gearing of the repeater-motor spring from the stem-driven train, substantially as specified.

16. The combination of a stem-driven train, a repeater-motor spring, and gearing interposed between the said stem-driven train and the said motor-spring, a shiftable wheel of the said gearing for transmitting the motion of the stem-driven train to the repeater-motor, a striking-rack, and a suitable device operated thereby for disconnecting the said wheel from the repeater-motor, substantially as specified.

17. In a watch, the combination, with a repeating mechanism having its motor-spring retracted by suitable gearing connected with a stem-driven train, of a device suitably connected with the repeating mechanism for disconnecting automatically the said gearing from the stem-driven train and being operated when the said repeating mechanism is released, substantially as specified.

18. In a repeating-watch, the combination, with a stem-driven train and suitable gearing connected with a motor-spring of the repeating mechanism for actuating the same, the said gearing adapted to be disconnected from the stem-driven train, of a striking-rack and a suitable device connected therewith and which operates on the said gearing when the striking-rack is being released, whereby the said gearing is automatically disconnected from the stem-driven train, substantially as specified.

19. In a repeating-watch, the combination of a suitable setting device, a spring for actuating the same, and suitable gearing for transmitting the motion of a stem-driven train to a repeater-motor spring, the said setting device adapted by the pressure of its spring to break the connection of the said gearing between the stem-driven train and the repeater-motor spring, substantially as specified.

20. In a repeating-watch, the combination of a stem-driven train and suitable gearing for actuating a repeater-motor spring and also for setting the repeating mechanism to a striking position, a repeating mechanism, and a setting device arranged to disconnect the said gearing from the stem-driven train when the repeating mechanism is being set to a striking position, substantially as specified.

21. In a repeating-watch, the combination of a gear-wheel for moving a striking-rack, a striking-rack, suitable gearing which connects the said wheel with a stem-driven train and turned thereby, and a suitable device that breaks the connection between the said wheel and the stem-driven train when the rack is in its striking position, substantially as specified.

22. In a repeating-watch, the combination of the wheel O, provided with an opening o^3 to give place for the seconds-hand staff of the time mechanism, a striking-rack placed upon the wheel O, and a device for moving the said rack, substantially as specified.

23. In a repeating-watch, a front plate of a watch, provided with an opening a^3 for the hammer-head, in combination with a gong-spring and a hammer for striking the time, said hammer being pivoted to the plate and moving its head in the said opening, the construction being such that when the time is struck the hammer-head is moved parallel to the said plate within the said opening, substantially as specified.

24. In a repeating-watch, the combination, with a front plate of a watch, of a bridge provided with a seat for a motor-spring and a motor-spring placed in the said seat of the bridge and arranged to be attached on the exterior surface of the said watch-plate, substantially as specified.

25. The combination, with a front plate of a watch, of a bridge provided with a seat for a motor-spring and which is placed in the same, the said bridge arranged with suitable seats for a moderating-gear pivoted in the said bridge and in the front plate, and means of fastening the bridge on the exterior surface of the said watch-plate, substantially as specified.

26. The combination, with a front plate of a watch, of a bridge placed on the exterior surface thereof, a motor-spring placed in a seat in the said bridge, a gear-wheel provided with a depression or seat for the said motor-spring, and a winding-arbor that carries the said gear-wheel, the said arbor being connected with the motor-spring and pivoted in the bridge, substantially as specified.

27. In a repeating-watch, the combination, with a front plate of a watch, of a bridge suitably attached to the exterior surface of the said plate, a motor-spring placed in a seat in the said bridge, and a gear-wheel provided with an arbor for actuating the said motor-spring, and a gear-wheel for moving the striking-racks, connected with the gear-wheel of the repeater-motor spring, substantially as specified.

28. In a watch or other timepiece, the combination of a winding-pinion connected by suitable gearing with a motor-spring of a repeating mechanism for actuating or setting the same and mechanism consisting of a re-

leasing device suitably connected with a repeating mechanism and operated by the said pinion, a repeating mechanism, and a suitable device that breaks the connection of the gearing between the repeater-motor spring and the said pinion automatically and operating when the repeating mechanism is released at its striking position, substantially as specified.

29. The combination of a winding-stem that actuates the repeater-motor spring and releases the repeating mechanism, a motor-spring and suitable gearing for actuating the same and operated by a winding-stem, a releasing device that is caused to release a repeating mechanism operated by the said stem, and a device suitably connected with the repeating mechanism, that disconnects the said gearing of the repeater-motor spring from the stem-winding gear when the repeating mechism is set to its striking position, substantially as described.

In testimony that I claim the foregoing as my invention I have hereunto subscribed my name the 3d day of April, 1890.

FRED TERSTEGEN.

In presence of—
ANTON T. HABERMEHL,
THOS. J. FARRELL.

(No Model.) 4 Sheets—Sheet 1.

C. STAHLBERG.

TIME STAMP.

No. 487,433. Patented Dec. 6, 1892.

Fig. 1.

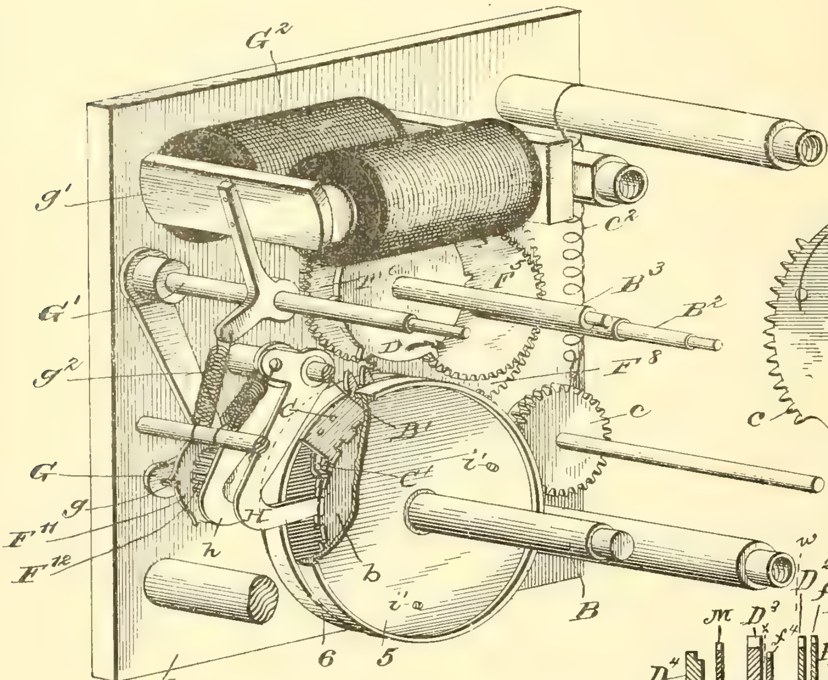


Fig. 17.

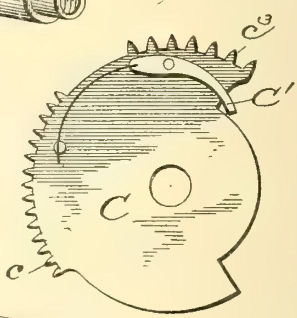


Fig. 4.

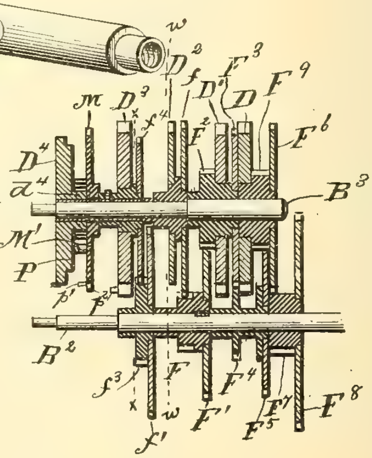


Fig. 2.

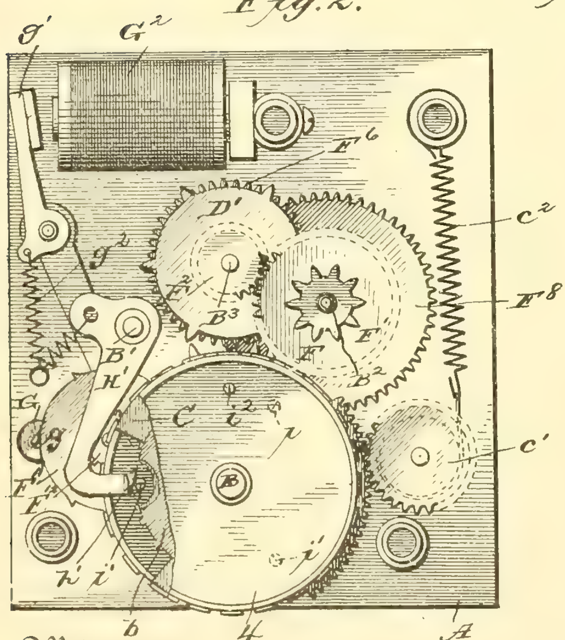
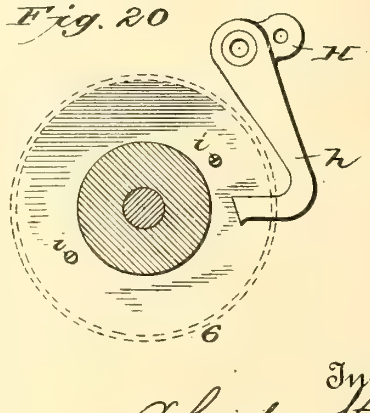


Fig. 20



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(No Model.) 4 Sheets—Sheet 2.

C. STAHLBERG.
TIME STAMP.

No. 487,433. Patented Dec. 6, 1892.

Fig. 13.

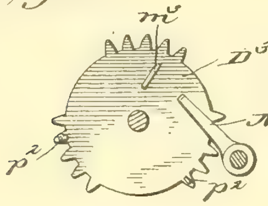


Fig. 3.

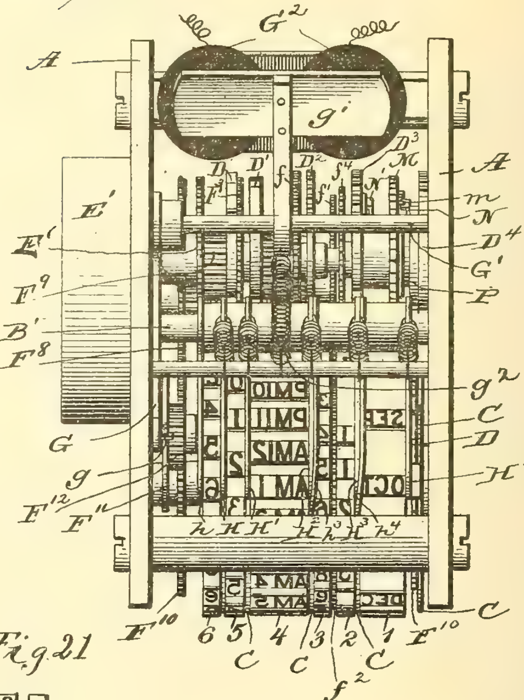


Fig. 19.

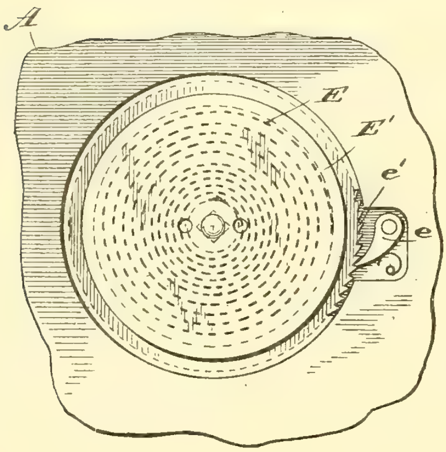


Fig. 21

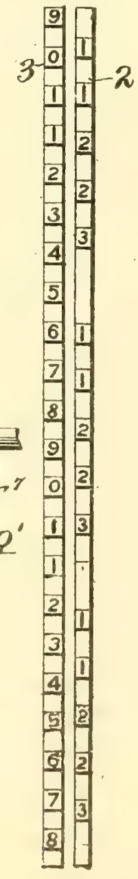


Fig. 14

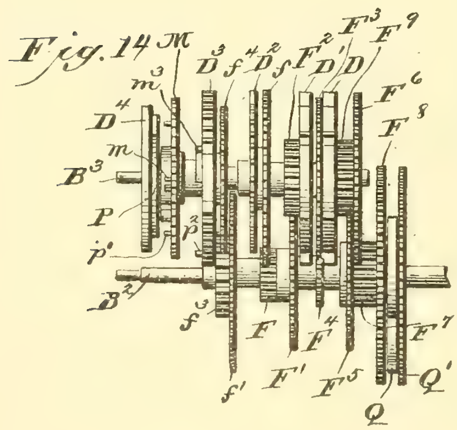
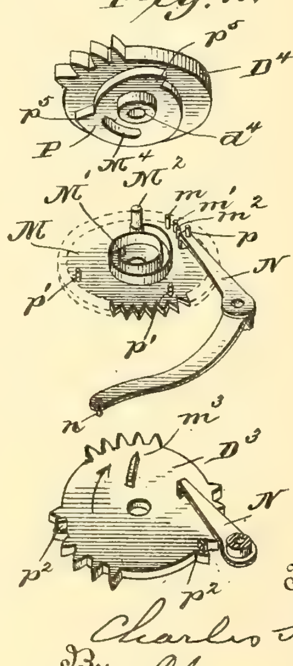


Fig. 11.



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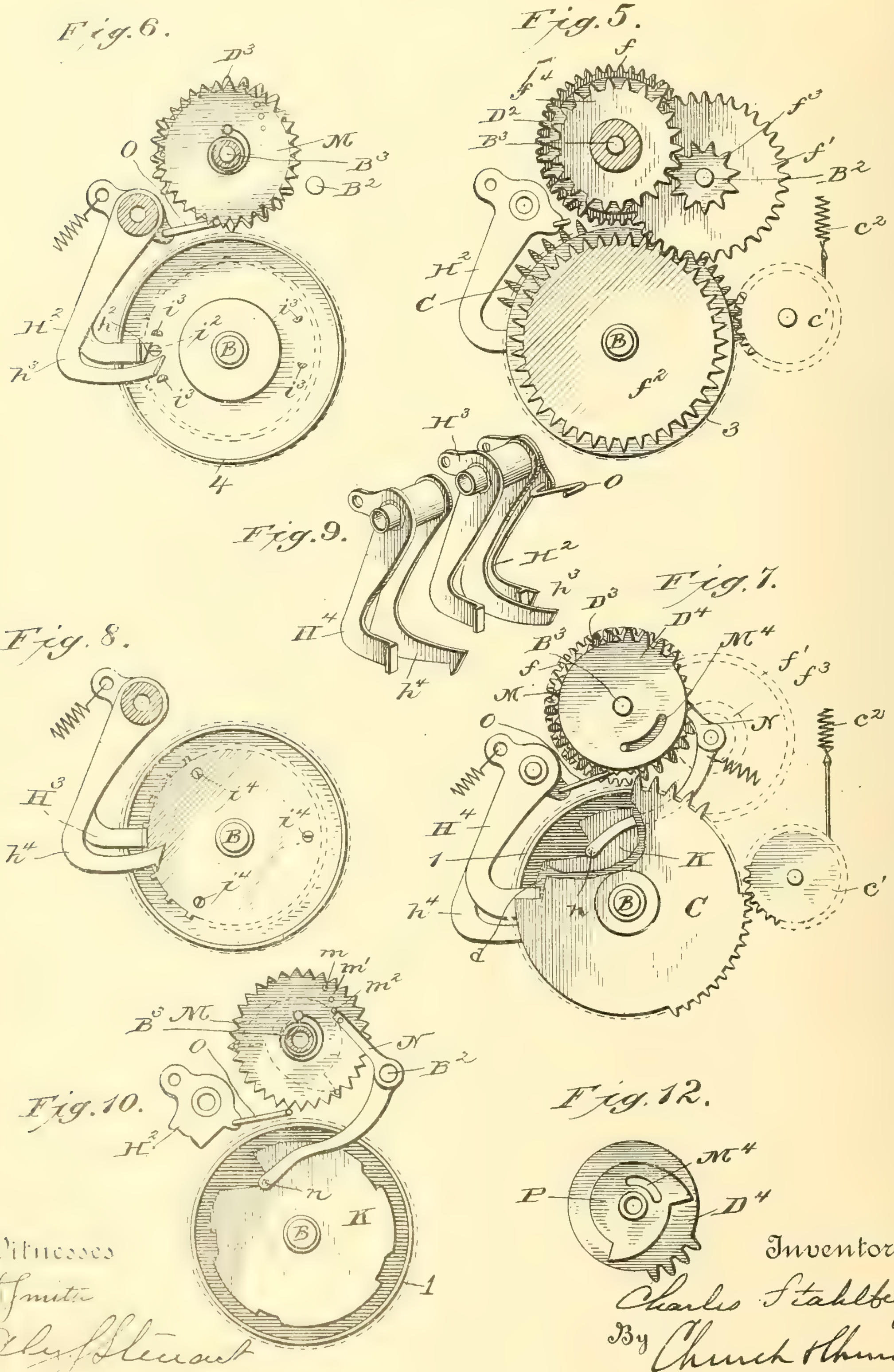
C. STAHLBERG.

TIME STAMP.

No. 487,433 Patented Dec. 6, 1892.



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(No Model.)

4 Sheets—Sheet 4.

C. STAHLBERG.

TIME STAMP.

No. 487,433.

Patented Dec. 6, 1892.

Fig. 16.

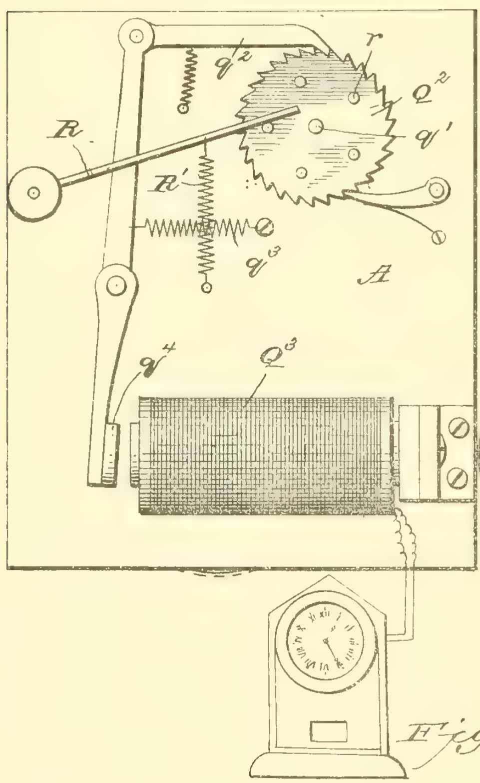


Fig. 15.

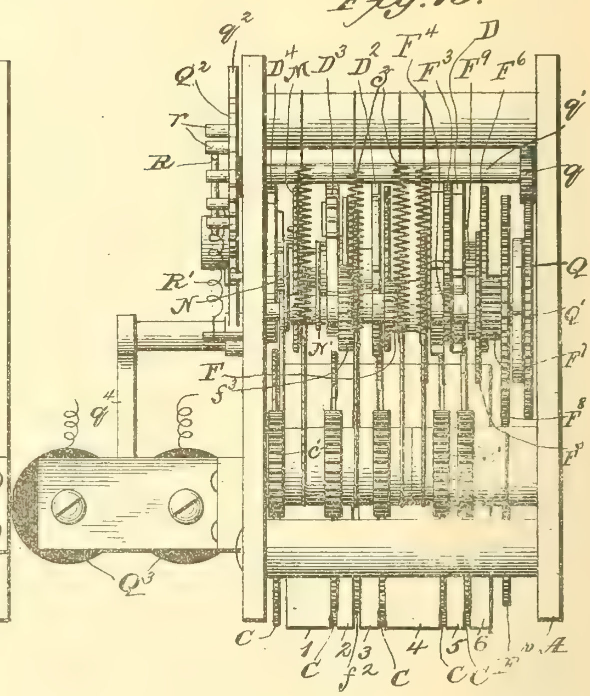
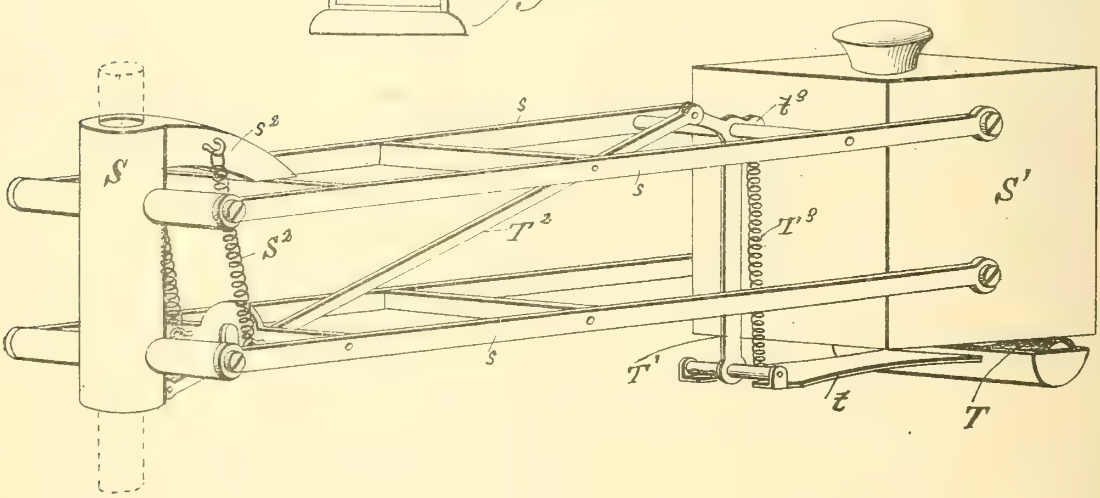


Fig. 18.



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UNITED STATES PATENT OFFICE.

CHARLES STAHLBERG, OF NEW YORK, N. Y., ASSIGNOR TO THE ACCURATE TIME STAMP COMPANY, OF WEST VIRGINIA.

TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 487,433, dated December 6, 1892.

Application filed February 18, 1891. Renewed April 21, 1892. Serial No. 430,085. (No model.)

To all whom it may concern:

Be it known that I, CHARLES STAHLBERG, of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Time-Stamps; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

The present invention relates to improvements in that class of stamps designed to automatically present at the printing-point the indices for registering the proper month, day, hour, and minute, its objects being to produce an accurate device, compact and capable of a wide range of usefulness in the capacity of time-taker, watchman's time-recorder, correspondence-stamp, post-office stamp, dating-stamp, &c., and which shall be capable of being made one of a series of similar devices controlled and operated from a central station through the medium of an electric circuit.

The invention consists in certain novel details of construction and combinations and arrangements of parts, all as will be hereinafter described, and pointed out particularly in the appended claims.

Referring to the accompanying drawings, Figure 1 is a perspective view looking into the works of a stamp designed in accordance with my present invention, with all the parts removed except the minute-wheels, their operating mechanism, and connected parts. Fig. 2 is a vertical section looking at the hour-wheel and connections, with the drive-shaft for running the minute-wheel, which parts have been placed upon the shafts shown in Fig. 1, and a portion of the hour-wheel broken away to show the lock-lever for the hour-wheel and the pin on the minute-tens wheel for releasing the same. Fig. 3 is a side elevation of the assembled works. Fig. 4 is a longitudinal section through the power-shaft and shaft carrying the segment-resetting wheels. Fig 5 is a section taken in a plane just above wheel M, Fig. 4; and Fig. 6 is a section on the line x x, Fig. 4, showing the locking-levers and actuating-wheels in proper relative positions. Fig. 7 is an elevation looking at the end portions of the mechanism with the casing removed, portions of the year-wheel-operating segment and lock-wheel being broken away to show underlying parts. Fig. 8 is a view of the date-tens wheel, showing its locking-lever and the pins for releasing the month-wheel-locking lever. Fig. 9 is a view of the month-wheel and date-tens wheel locking-levers and their releasing-levers and also the date-wheel-locking lever and its arm for engaging the skipping-wheel. Fig. 10 is a plan of the cam on the month-wheel and lever and pins controlling the extent of the skip for long and short months. Fig. 11 is a detail perspective of the skip-controlling mechanism with the parts separated. Figs. 12 and 13 are detail plans of some of the wheels, Fig. 11. Fig. 14 is a side elevation of the shafts and gearing shown in Fig. 2 with the preferred mechanism for driving the power-shaft and minute mechanism. Fig. 15 is a side and Fig. 16 an end elevation of the preferred mechanism assembled. Fig. 17 is a detail of one of the segments. Fig. 18 is a side elevation of the preferred mechanism for carrying and supporting the stamp. Fig. 19 is an elevation of the spring-case shown in Fig. 2. Fig. 20 is an elevation of the minute-units type-wheel, its pins, and the release-lever for minute-tens wheel. Fig. 21 is a diagrammatical illustration of the arrangements on the date-units and date-tens wheels.

Similar letters and numerals of reference in the several figures indicate the same parts.

Heretofore in stamps of this character it has been found practically impossible to get them into compact form because of the apparent necessity for the employment of levers, strictly speaking, and other mechanism for driving the various wheels for recording the months, days, &c., which mechanism could not be completely arranged, and, furthermore, could not be subjected to such rough usage as would be given the stamps in the ordinary course of business without destroying the accuracy and possibly absolutely injuring the parts of the mechanism.

In my present invention I have practically done away with the lever connections, &c.,

heretofore deemed so necessary and employ gearing for driving and in a large measure controlling the various wheels, the only levers retained being those whereby the movement of the wheels are controlled one by the other to produce the proper sequence of movements to indicate the various phases of time.

Referring now to the drawings, the frame or casing is indicated by the letter A and is of the ordinary construction of clock-work frames—*i. e.*, having front and back plates in which the shafts are journaled and corner-posts for properly spacing the plates.

The type-wheels, to be presently particularly designated, are mounted on the shaft B, journaled in the lower central part of the frame to enable their peripheries to project far enough to give the necessary impression of the characters at the printing-point.

In the present instance the wheels are arranged on the shaft in the following order, to wit: 1, the month-wheel; 2, the date-tens wheel; 3, the date-units wheels; 4, the hour-wheel; 5, the minute-tens wheel, and 6 the minute-units wheel, and all of these wheels, save the minute-units wheel 6, have on one side or the other thereof lock-wheels *b*, having straight-sided teeth adapted to co-operate with some one of the locking-levers pivoted on the shaft B′ and adapted to be released periodically by the movement of some one of the other type-wheels to permit the said wheels to rotate forward under the influence of the normally-active impelling-springs, as will more fully appear hereinafter. Journaled also on the shaft B between and on the sides of the type-wheels corresponding to the lock-wheels are the operating-segments C, one for each wheel, save the minute-wheel, which segments are spring-actuated in one direction and through the medium of the pawls C′, engaging the lock-wheels *b* of each wheel, respectively, tend to move the type-wheels forward, such movement being prevented normally, however, by the lock-levers aforesaid. The operating-segments have at one point in their peripheries teeth *c*, which engage pinions *c*′, having the springs c^2 connected thereto for moving the segments to carry the type-wheels forward, and preferably at another point on their peripheries are other teeth c^3, adapted to co-operate with the resetting-wheels D, driven from the main motor and having relatively and widely spaced teeth, or what is commonly known as "mutilated gear-teeth," thereon which engage the operating-segments to reset them at the moments when the type-wheels are stationary and they have no work to perform, the gearing being so proportioned as that one of the spaces between their teeth is next the segment when the latter moves forward and the train is so arranged and the teeth of the mutilated gears so positioned that they engage the segments to rewind the springs in the same ratio that the springs are run down. As some of the type-wheels have to move farther than others, though less frequently, as the date and month wheels, to compensate for the different numbers of days in the months, the segments for operating them must have a greater range of movement. Hence they are provided with a greater number of teeth c^3, as shown, for instance, in Figs. 6, 7, and 17. The shaft B^2 carries the drive-gearing, and, as shown in Figs. 1, 2, 3, 4, and 19, the power is derived directly from a spring E, (dotted lines, Fig. 19,) within a drum E′ on the outside of the casing, one end of the spring being connected to the end of said shaft and the outer end to the drum, which latter is adapted to be turned to wind the spring and is prevented from moving in the reverse direction by the pawl *e* and peripheral ratchet-rim *e*′.

All the gears and pinions are loosely mounted on the shaft B^2, save the pinion F and its connected gear-wheel F′, and from these two, in this instance, the whole device is driven, the train of gearing being as follows: The wheel F′ meshes with the pinion F^2 on shaft B^3, which pinion carries the resetting-wheel D′ for the hour-wheel segment and also the gear-wheel F^3. The latter meshes with a pinion F^4, carrying the wheel F^5 and journaled on shaft B^2. From the wheel F^5 the train runs to pinion F^9, carrying the minute-tens segment-resetting wheel D and wheel F^6, and from the latter to the pinion F^7, carrying the large gear F^8, which meshes with the gear-wheel F^{10} on the minute-units wheel. The result of this train is that the resetting-wheel for the hour-wheel segment is given a relatively-slow movement, the corresponding wheel for the minute-tens-wheel segment a faster movement, and the wheel for running the minute-units the fastest of all, the speed of the type-wheels themselves being in exactly the same proportion relative to each other. From the pinion F the train runs in the opposite direction to the wheel *f*, which carries the resetting-wheel D^2 for the date-units-wheel segment, with which wheel *f* the direct connection of the train stops, but the date-units wheel 3 has upon one side a large gear f^2, Fig. 5, with which the gear *f*′ meshes. The latter carries a pinion f^3, meshing with a gear-wheel f^4, carrying the resetting-wheel D^3 for the date-tens-wheel segment and also the resetting-wheel D^4 for the month-wheel segment, the latter having only a few teeth at one side, as shown in Fig. 12. The wheels D^3, Fig. 13, and the wheel D^4, besides serving as the resetting-wheels for the said segments, also serve as two of the wheels for the skipping mechanism, an intermediate wheel M, mounted between them, being the other wheel of the skipping mechanism, which will be presently described.

In the device shown I propose to release the minute-units wheel, and through it all the other wheels, by means of an electro-magnet in a circuit over which impulses are sent at predetermined intervals by a distant time-piece, and in the simplest form of mechanism

a manually-wound spring is employed with a simple escapement stop-wheel F^{11}, Figs. 1 and 2, having a pinion F^{12} meshing with the wheel F^{10}, Fig. 3, on the minute-units wheel, and a pallet G, having pallet-points g and mounted on a shaft G', which shaft also carries an operating-arm with an armature g' adapted to be moved in one direction by the electro-magnet G^2 in the circuit, as aforesaid, and in the other direction by a spring g^2 to release the train at proper intervals.

The locking-levers for the various type-wheels are, as before stated, pivoted on shaft B', and they with their attached releasing-levers will now be described in their regular order, beginning with the one for minute-tens, and which in the drawings is lettered H. This lever H passes in between the two minute-wheels and has, as has all of the locking-levers, a rectangular end projection, which fits accurately into the space between two teeth of the lock-wheel and locks the wheel against movement in either direction until released. The release-lever h for the lever H is connected thereto through the hub and passes down on the opposite side of the minute-units wheel, where it projects into the path of the two releasing-pins i, one or the other of which engages the releasing-lever at the moment the units-wheel is changing from "9" to "0," and releases the tens-wheel, permitting it to move forward one space, which brings its next number to the printing-point. Two pins are employed, because two sets of digits are arranged on the periphery of the units-wheel, and it is necessary for the tens-wheel to jump as the change is made from one set of digits to the other. It is obvious, however, that were a single set of digits employed but one pin would be needed, and so, too, if more than two sets were employed there must be a pin for each set.

The minute-tens wheel for convenience has three sets of figures, from "0" to "5," inclusive, for indicating the tens, twenties, thirties, forties, and fifties, the "0" standing in place at the hour and during the time the minutes from "1" to "10" are being indicated.

As the registration of each set of numbers indicates the passage of one hour, the tens-wheel must needs carry three releasing-pins i', (one shown in full lines and the other in dotted lines in Fig. 2,) said pins being adapted to co-operate with the inclined end h' of the locking-lever H' for the hour-wheel, the end of the lever being thus made to constitute its own inclined releasing-lever arm or projection. It is necessary, of course, that the lock-wheel in this instance be on the side of the hour-wheel next the minute-tens wheel, so that the pins and locking-lever may co-operate properly.

The hour-wheel 4 is provided with twenty-four indices and revolves once a day only, and has of course to release the date-units wheel but once in a revolution. Therefore it carries but one pin i^2, which engages the end h^2 of the locking-lever H^2 for the date and units wheel just as described with relation to the locking-lever H' and as shown clearly in Fig. 6.

The date-units wheel 3 is provided on its periphery with two sets of digits and with an additional figure "1" between each set immediately after the "0," the arrangement, as shown in Fig. 21, thus being "0," "1," "1," "2," &c.

The date-tens wheels is provided on its periphery with three sets of numbers, as follows, to wit: "1 1" "2 2" "3," between each of which sets are blank spaces, as also shown in said Fig. 21.

The locking-lever H^3 for the date-tens wheel is provided with a releasing-lever, the two being connected at the hub, as shown clearly in Fig. 9, and straddle the said two wheels, as will be readily understood.

On the outer side of the date-units wheel are arranged two pairs of pins i^3, sections of which are shown in Fig. 6, said pins being adapted to release the tens-wheel. The first one of each pair operates as the change of the units-wheel is made from "9" to "0," so as to bring the first figure "1" or the first figure "2" or the "3" of the tens-wheel into position, and the second pin of each pair operates to release the locking-lever as the tens-wheel changes from the first figure "1" to the second figure "1," the result of which movements will be presently explained. The date-tens wheel rotates but once in three months, as each set of figures thereon indicates the first figures for the days of the month from the tenth to the thirty-first day, and said wheel is provided on the outer surface of its locking-wheel with three pins i^4, Fig. 8, adapted to engage the releasing-lever h^4 and release the month-wheel locking lever H^4 at the proper moment to cause the month change as the said date-tens wheel moves from "3" to blank.

Inside of the locking-wheel b for the month-wheel or between it and the month-wheel is arranged the cam K, having in its periphery the usual cam indentations of varying depth for the purpose of controlling the extent of the skipping at the end of the month.

If reference is made to my patent, No. 424,360, issued March 25, 1890, it will be seen that in that instance I mounted directly on the date-wheel what I was pleased to term a "sector," the function of which was to hold the locking-lever for the date-wheel out of engagement long enough for the proper skipping of days for the long and the short months, the position of the sector being determined by the cam on the month-wheel, and while in the present instance the mechanism is quite dissimilar, the principle so far as the controlling of the skipping for long and short months is concerned is the same; but I do not wish to be understood as limiting myself to this or any other skipping mechanism, as other mechanism may be substituted for it, and the other

devices and mechanisms hereinbefore described do not depend upon it for their individual successful operation.

Referring particularly to Figs. 7, 10, 11, and 14, it will be seen that between the wheels D^3 D^4 on the shaft B^3 is a loose intermediate wheel M, the said wheels D^3 D^4 being connected for simultaneous movement by means of a hub d^4. To this hub d^4 one end of the small coil-spring M' is affixed, the opposite end being connected to the wheel M by means of the pin M^2. This wheel M is toothed and corresponds to the sector in my before-mentioned patent, being provided with three pins m m' m^2, arranged in succession, and any one of them adapted to be engaged by the bell-crank retarding-lever N, the opposite end of which is provided with a pin n, which rests in one of the cam depressions on the month-wheel. Thus for a month of twenty-eight days it will engage the first pin m^2 and for a month of thirty days the last pin m, the first one causing a skip of three days and the last of only one day.

The locking-lever for the date-units wheel is provided with a bent arm or extension O, Figs. 6, 7, and 9, the end of which under normal conditions—that is to say, during the month and when no skip is to be made—passes in between two of the teeth on wheel M; but when said wheel is arrested by the retarding-lever N the arm O will rest on the end of one of said teeth (see Fig. 10) and prevent the locking-lever from being thrown into engagement with its locking-wheel, it being a simple matter of computation to so adjust the depth of the cam depressions and the positions of the pins that the locking-lever shall be held out just the right length of time at the end of each short month; but to prevent any possibility of miscalculation or the effect of momentum and to positively arrest the movement at the proper moment—to wit, when the second figure "1" is brought into position—a stop m^3 is mounted on the wheel D^3, and adapted to engage an arm N' of the bell-crank retarding-lever N, as will be readily understood. The intermediate pin m' has no office in the mechanism, as shown in the drawings, being designed to secure the proper skip for leap-years and the co-operation of the skipping lever with it is controlled by the year-wheel, which is not shown in the present device. Hence the mechanism must be regulated by hand to compensate for the twenty-ninth day of February in the leap-years.

So far I have not described any provision for skipping the extra figure "1" and bringing the date-tens wheel into position at the tenth and twentieth days, and this is accomplished through the mechanism for skipping days at the ends of the month only. Instead of the month-cam a cam P is provided on the under side of the wheel D^4, Figs. 11 and 12, which cam is adapted to engage the pin p on the retarding-lever N as the date-units wheel passes from "9" to "0" twice in succession—that is to say, at the ninth and nineteenth day, respectively—the third time, which would occur at the end of the month, said cam being inoperative. To accomplish this the said cam is provided with two projections only p^5, the distance between which in one direction around the wheel is twice as great as in th other, or, as will be more easily understood, the wheel is divided into three equal parts, and the two cam-points are located at two of the divisions and the pins m m' m^2 at the other division.

On the wheel M, outside of the orbit of the pins m and corresponding in position to the position of the cam-points p^5 of the cam P, are two pins p'. The end of the lever N is in position to pass outside of the pins m and inside of pins p'; but at the tenth day the cam P engages the pin p, throws the lever out into the path of one of the pins p', and causes the "skipping-wheel" (as I term wheel M) to be arrested and the locking-lever H^2 held out of engagement until the type-wheel has made one skip from "0" to the second "1," and the tens-wheel, by reason of the pins on the units-wheel, to move from the first to the second one of the figures, which are at the printing-point—*i. e.*, from "1" to "1" or "2" to "2."

On the wheel D^3 are provided two additional stops p^2 p^2, corresponding to the stop m^3, only they are adapted to engage the arm N' when the bell-crank retarding-lever engages the pins p', the functions of the stops in every instance being the same. The spring M' serves to bring the wheel M back to normal position as soon as released from the retarding-lever, and to gage and limit its movement the pin M^2 passes through a curved slot M^4 in the wheel D^4. The operation of this immediate part of the mechanism is as follows: Assuming that the date-wheels are printing the fifteenth day, the second figure "1" on the tens-wheel will be in position, and the units-wheel will move regularly forward by means of its operating-segment and the release of its locking-lever by the hour-wheel until the nineteenth day is ended, when as the units-wheel passes from "9" to "0" the first one of a pair of the pins i^3 will engage the tens-wheel-releasing lever h^3 and permit the first figure "2" on the tens-wheel to come to the printing-point indicating the twentieth day. Then as the units-wheel passes from "0" to the first figure "1" the cam P operates upon the retarding-lever N to throw it in the path of one of the pins p' and bring a tooth of the wheel M beneath the arm O of the units-wheel-locking lever H^2, preventing the same from engaging until the second figure "1" comes into position, and as the units-wheel passes from "1" to "1" the second of the pins i^3 engages the releasing-lever h^2 and permits the tens-wheel to advance one tooth, bringing its second figure "2" into position, at which point it remains until the units-wheel has gone forward to the twenty-ninth day. As the units-wheel passes from "9" to

"0" the first one of the next pair of pins i^3 is brought into operation and the tens-wheel advanced one space, bringing the "3" into position and indicating the thirtieth day. If the month is one having thirty-one days, the retarding-lever N passes outside of the pin m and the units-wheel advances one space, bringing the first figure "1" into position and indicating the thirty-first day; but if the month be one having a less number of days—say thirty—the retarding-lever will be moved into position by the cam on the month-wheel to engage the pin m, causing the locking-lever H^2 to be held out of engagement and a skip of the tens-wheel made from "0" to the second figure "1," the tens-wheel being moved, as usual, when the units-wheel changes from the first figure "1" to the second figure "1," bringing a blank space on the tens-wheel into position, when the units-wheel is advanced regularly until the end of the ninth day, and as it turns from "9" to "0" the tens-wheel-locking lever is released and the first figure "1" is brought into printing position. The next movement of the mechanism brings one of the points of the cam P into position for causing a skip of the units-wheel to the second figure "1" and the consequent advance of the tens-wheel to the second figure "1" to indicate the eleventh day, the operations being thus repeated, as described, with relation to the twentieth day. The skipping at the end of shorter months is caused by the engagement of the retarding-lever with either the pin m' or m^2, the latter causing a skip of three days—*i. e.*, from the twenty-eighth to the first of the next month by holding the locking-lever H^2 out of engagement for a proper period. The month-wheel-locking-lever is released at the moment the tens-wheel moves from "3" to blank. Hence the end of the bell-crank lever N rests in position until the wheels are completing their movements and there is no need of the lever remaining longer in position, the only requisite being that the end of the lever should reach the proper place for the next month before the movement of the cam ceases.

The operation of the whole device is readily seen from the foregoing, it being necessary only to send impulses through the electro-magnet once a minute to release the minute-units wheels at minute intervals, and the latter through the mechanism described controls directly or indirectly the operation of the whole train; but with the mechanism so far described it is necessary to wind the motor-spring manually, and it has heretofore been found necessary where an accurate mechanism is made either to have a manually-wound spring or else employ strong currents of electricity, owing to the fact that it requires a comparatively powerful and long range of movement to actuate the minute-wheel once a minute, it being obvious that it cannot be actuated more or less frequently when acurate registration is required. To overcome these defects and provide a mechanism which will operate the entire device through the medium of comparatively-weak currents and a magnet having a relatively-short range of movement is one of the objects of the present invention, and by referring to Figs. 14, 15, and 16, it will be seen how the result is accomplished. The wheel F^8, which meshes with the wheel F^{10} on the minute-units wheel, remains unchanged; but instead of being driven through the train of gearing comprising the wheels and pinions F' to F^7, it is itself the driver and has secured thereto on its outer side the inner end of a light coil-spring Q, the outer end of which is secured to the large gear Q', meshing with a pinion q on a shaft q' and serves as a constant source of power, being wound by the mechanism to be now described. On the shaft q' and preferably outside of the casing is a ratchet-wheel Q^2, which is adapted to be operated by the pawl q^2, which is moved forward by a spring q^3 and retracted by the electro-magnet Q^3 and armature q^4. The relatively-rapid movement of the wheel F^8 with the before-described gearing-down train and the further extension of the gearing through the wheels Q', q, and Q^2 with the interposition of the spring Q enables me to run the train of gearing with a very light current and weak electro-magnet, it being necessary to operate the magnet a number of times in each minute, the power being accumulated in the spring, and the only other requirement is that the minute-wheel should be released once a minute. This I accomplish by mounting on the end of the shaft G', carrying the pallet, a pallet-operating arm R, which while it is operated by the electro-magnet is not operated at each movement of the same but projects into the path of the series of pins r on the wheel Q^2, and one of said pins is brought into position for operating the pallet once a minute. In the construction shown the pallet-operating arm is moved in one direction by the said pins and in the opposite direction by the spring R'.

In the practical working of a stamp I prefer to mount it in a support such as is shown in Fig. 18. S is a base mounted on a vertical pivot held rigidly in any suitable manner. s s are two pairs of arms pivoted to the base and similarly pivoted to a case S', which they carry at the outer ends. The stamp mechanism is mounted in this case and has a direct vertical movement, which always presents the face of the types squarely to the printing-surface. Upward movement of the stamp is limited by the stop s^2, and I prefer to elevate it by means of the coil-springs S^2, connected to the stop and the lower pair of arms, it being only necessary then for the operator to depress the stamp to make the impressions, thereby materially increasing the speed with which these devices may be handled, and adapting them for use in post-office work, &c.

If desired to make the impressions direct from the type, an inking-roller T is employed,

mounted on an arm t, pivoted on the end of the bell-crank lever T', the latter being in turn pivoted between the upper pair of arms, and has one of its shorter arms connected by a link T^2 to the base S. The arm is held up by a link spring T^3, connected at one end to a third arm t^3 of the bell-crank lever and at the opposite end to the said roller-carrying arm t in front of its pivotal connection. When the casing is depressed, the ink-roller is drawn over the face of the type, and as the downward movement continues the roller moves beyond the casing and is held up off of the printing-surface, the upward movement of the casing causing a reverse movement of the roller.

The impulses for operating the stamp may be sent over the line and controlled by a distant clock of any of the well-known varities, in one instance the impulses being sent a certain definite number of times per minute and in the other instance once a minute.

The obvious advantage of a system in which a series of stamps can be absolutely and accurately controlled from a central station and timepiece are too obvious to mention, and will be at once appreciated by those skilled in the art, especially where, as in the present instance, it is not necessary to employ a manually-wound spring, the whole power for the initial movement being accumulated in a spring which may be wound at short intervals by a weak current of electricity or other medium for connecting the controlling-clock and stamp.

I do not wish to be understood as limiting myself to the employment of the mechanisms herein described in a "time-stamp," as the same may be employed in any time-indicator, and the type-wheels, instead of being adapted to make impressions, may be employed to give visual indications of the passage of time. Therefore in the claims the term "time-stamp" will be understood as covering this class of devices.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a time-stamp, the combination, with the spring-impelled printing mechanism for indicating the phases of time and locking-levers co-operating with said printing mechanism and holding the same against the tension of the impelling-springs, of the minute printing mechanism controlling said locking-levers to release the same at predetermined intervals and permit the impelling-springs to actuate the printing mechanism, substantially as described.

2. In a time-stamp, the combination, with the spring-impelled type-wheels for indicating the phases of time, the locking-wheels thereon, and the locking-levers engaging said wheels and holding them against rotation under the influence of their impelling-springs, of the minute-wheel controlling the locking-levers for the said printing-wheels, whereby the same are released and the wheels permitted to rotate under the influence of their said impelling-springs, substantially as described.

3. In a time-stamp, the combination, with the month, date, and hour type-wheels having independent impelling-springs independent of the releasing mechanism for the locking-levers, of the minute-wheel, the locking-lever for the hour-wheel moved thereby, the locking-lever for the date-wheel moved by the hour-wheel, and the locking-lever for the month-wheel moved by the date-wheel, said locking-levers being adapted when released to lock the wheels against movement under the influence of their impelling-springs, substantially as described.

4. In a time-stamp, the combination, with the month, date, and hour type-wheels having independent impelling-springs independent of the releasing mechanism for the locking-levers and a locking-lever for each wheel for holding them against the power of their impelling-springs, of the minute-wheel, the pin thereon controlling the locking-lever of the hour-wheel, the pin on the hour-wheel controlling the locking-lever of the date-wheel, and the pin on the latter controlling the locking-lever of the month-wheel, substantially as described.

5. In a time-stamp, the combination, with a series of independent printing-wheels for the various phases of time to be indicated and a corresponding series of independent impelling-springs normally connected with and tending to rotate said wheels forward, of locking-levers engaging and holding the wheels from rotation under the influence of said springs and periodically-operated releasing mechanism for throwing said locking-levers out of engagement and permitting the springs to operate, substantially as described.

6. In a time-stamp, the combination, with a series of independent printing-wheels for the various phases of time to be indicated, and a corresponding series of independent impelling-springs normally connected with and tending to rotate said wheels forward, and periodically-released locking-levers engaging and normally holding said wheels from rotation under the influence of their impelling-springs, of a driven train of gearing for rewinding each of said series of springs, substantially as described.

7. In a time-stamp, the combination, with a series of independent printing-wheels for the various phases of time to be indicated, a corresponding series of independent impelling-springs normally connected with and tending to rotate said wheels forward, and periodically-released locking-levers engaging and normally holding said wheels from rotation under the influence of their impelling-springs, of a driven train of gearing carrying mutilated gears for resetting the springs during the periods of rest of the type-wheels, substantially as described.

8. In a time-stamp, the combination, with a

series of independent printing-wheels for the various phases of time to be indicated, a corresponding series of independent impelling-springs normally connected with and tending to rotate said wheels forward, and periodically-released locking-levers engaging and normally holding said wheels from rotation under the influence of their impelling-springs, of a driven train of gearing carrying mutilated gears for resetting the springs during the time the type-wheels are at rest, the teeth of the mutilated gears being proportional and connected in the train to move at the same ratio as the type-wheels, whereby the springs are rewound the exact amount that they are run down by the movement of the type-wheels, substantially as described.

9. In a time-stamp, the combination, with the type-wheels, of the segments engaging the same to advance the wheels, the springs for turning the segments in one direction, and the power-gearing for turning them in the opposite direction, substantially as described.

10. In a time-stamp, the combination, with the type-wheels, of the segments, the pawl connections between the segments and said wheels, the springs for turning said segments in one direction, and the power-driven mutilated gears for turning them in the opposite direction, substantially as described.

11. In a time-stamp, the combination, with the type-wheels mounted on a common shaft, of the operating-segments mounted on the same shaft between the wheels, the springs for moving said segments, and the train of gearing for rewinding the springs, substantially as described.

12. In a time-stamp, the combination, with the type-wheels mounted on a common shaft, of the toothed operating-segments mounted on the same shaft between the wheels, the pawl connections between the segments and wheel-springs for moving the segments in one direction, and the driven mutilated gearing engaging the segments and moving them in the opposite direction, substantially as described.

13. In a time-stamp, the combination, with the type-wheels mounted on a common shaft and carrying the lock-wheels, of the toothed operating-segments mounted on said shaft between the wheels and having the pawls engaging the lock-wheels, the gears meshing with said segments, the springs connected to the same to move the segments in one direction, the power-train, and the mutilated gears carried by said train for moving the segments in the opposite direction and rewinding the springs, substantially as described.

14. In a time-stamp, the combination, with the minute-units wheel having a series of sets of digits thereon, a spring for turning the same, and escapement controlling its movements, of the minute-tens wheel, the spring for rotating the same, the locking-lever, and the pins on the units-wheel engaging the locking-lever as the end of each set of digits passes from the indicating-point, substantially as described.

15. In a time-stamp, the combination, with two printing-wheels arranged side by side, the lock-wheel on one of them, and a pin on the other, of a locking-lever having the rectangular projection engaging the lock-wheel and the inclined end projecting into the path of the pin on the other type-wheel, whereby the rotation of the latter causes the release of the former, substantially as described.

16. In a time-stamp, the combination, with the date-units wheel, having a set of digits thereon with a duplicate figure "1" and a date-tens wheel having duplicate figures "1" and "2," a figure "3," and a blank or zero space thereon, of a locking-lever for the tens-wheel and a pair of releasing-pins on the units-wheel for releasing the said lever twice in succession and permitting the same to remain at rest during the time the units-wheel is passing the digits from "2" to "9," substantially as described.

17. In a time-stamp, the combination, with the date-units wheel and the date-tens wheel, of a locking-lever for the date-tens wheel and a pair of relatively-closely-spaced pins on the units-wheel for releasing said levers twice in succession, whereby the tens-wheel is caused to move at irregular intervals and the proper registration made, substantially as described.

18. In a time-stamp, the combination, with the date-units wheel and the date-tens wheel controlled thereby, of the locking-lever for the units-wheel, a skipping-wheel for holding said lever out of engagement, and a cam for moving said skipping-wheel into operative position at the tenth and twentieth days, substantially as described.

19. In a time-stamp, the combination, with the date-units wheel and the date-tens wheel controlled thereby, of the locking-lever for the units-wheel, a skipping-wheel for holding said lever out of engagement, and a cam having two points moved by the units-wheel for throwing the skipping-wheel into operative position at the tenth and twentieth days, substantially as described.

20. In a time-stamp, the combination, with the spring-impelled date-wheel, locking-lever therefor, and month-wheel having the cams thereon, of the skipping-wheel separate from the date-wheel for holding the locking-lever out of engagement and a retarding-arm moved by the month-wheel and engaging the skipping-wheel at the end of short months to cause the proper skipping of indices, substantially as described.

21. In a time-stamp, the combination, with the spring-impelled date-wheel, locking-lever therefor, and month-wheel having the cams thereon, of the skipping-wheel separate from the date-wheel, the retarding-lever moved by the month-wheel and engaging the skipping-wheel at the end of short months, and the cam

engaging and moving said lever into position to engage the skipping-wheel at the tenth and twentieth days, substantially as described.

22. In a time-stamp, the combination, with the date-units wheel having a set of digits thereon with duplicate figures "1," of a date-tens wheel having a partial set of digits with the figures in duplicate, save the last one, a skipping-wheel, and operating mechanism therefor controlling the skipping of the units-wheel from "0" to the second figure "1," and a locking-lever for the tens-wheel, controlled by the units-wheel and operated during the passage of the units-wheel from the first figure "1" to the second figure "1," substantially as described.

23. In a time-stamp, the combination, with the date-wheel, the skipping-wheel, the gears between said date-wheel and skipping-wheel, and the spring forming the connection between the skipping-wheel and said gears, of the retarding-lever engaging said skipping-wheel and the locking-lever for the date-wheel, held out of engagement by the skipping-wheel when in operative position, substantially as described.

24. In a time-stamp, the combination, with the date-wheel, driving mechanism, and the wheel D^4, connected by gearing with said date-wheel, of the skipping-wheel M, mounted in proximity to the wheel D^4, a spring connecting the said wheels, the locking-lever for the date-wheel held out of engagement by the skipping-wheel, and the retarding-arm engaging the skipping-wheel to hold it in operative position, substantially as described.

25. In a time-stamp, the combination, with the date-wheel, driving mechanism, and the wheel D^4, connected by gearing with said date-wheel, of the skipping-wheel M, mounted in proximity to the wheel D^4, a spring connecting the said wheels, the locking-lever for the date-wheel held out of engagement by the skipping-wheel, the retarding-arm engaging the skipping-wheel to hold it in operative position, and the cam moving with the wheel D^4 and engaging the retarding-arm to set the same, substantially as described.

26. In a time-stamp, the combination, with the date-wheel, driving mechanism, and the wheel D^4, connected by gearing with said date-wheel, of the skipping-wheel M, mounted in proximity to the wheel D^4, a spring connecting the said wheels, the locking-lever for the date-wheel held out of engagement by the skipping-wheel, the retarding-arm engaging the skipping-wheel to hold it in operative position, the cam moving with the wheel D^4 and engaging the retarding-arm to set the same, and the stop for arresting the movement of the wheel D^4, substantially as described.

27. In a time-stamp, the combination, with the date-wheel, driving mechanism, the wheels D^3 D^4, connected by gearing with said date-wheel, skipping-wheel mounted between the wheels D^3 D^4, and the spring connecting the skipping-wheel and wheels D^3 D^4, of the locking-lever for the date-wheel held out of engagement by the skipping-wheel, the retarding-arm engaging the skipping-wheel to set the same, the cam on the wheel D^4 for moving the arm, and the stops on the wheel D^3 for arresting the movement of the date-wheel, substantially as described.

28. In a time-stamp, the combination, with the printing mechanism, substantially as described, and the train of gearing for driving said printing mechanism, of the spring for driving said train, a winding mechanism for said spring, an electric motor for driving said winding mechanism at short predetermined intervals, and an escapement controlling the movement of the printing mechanism operated by the winding mechanism, substantially as described.

29. In a time-stamp, the combination, with the type-wheels, independent impelling-springs therefor, and a train of gearing for rewinding said springs, of the minute-wheel-impelling spring connected in said train to drive the same and an electric motor for rewinding said minute-wheel-impelling spring, substantially as described.

30. In a time-stamp, the combination, with the type-wheels, independent impelling-springs therefor, and a train of gearing for rewinding said springs, of the minute-wheel-impelling spring connected in said train to drive the same, an electric motor for rewinding said minute-wheel-impelling spring, and an escapement controlling the movement of the minute-wheel operated by said electric motor, substantially as described.

31. In a time-stamp, the combination, with the type-wheels, independent impelling-springs therefor, and a train of gearing for rewinding said springs, of the minute-wheel-impelling spring connected in said train to drive the same, a ratchet-wheel for rewinding the last-mentioned spring, an electric motor for turning said ratchet-wheel, an escapement controlling the movement of the minute-wheel, and a series of pins on the ratchet-wheel for operating the escapement, substantially as described.

32. In a time-stamp, the combination, with the printing mechanism and the casing therefor, of the parallel arms carrying said casing mounted on a pivoted support, substantially as described.

33. In a time-stamp, the combination, with the printing mechanism and the casing therefor, of the parallel arms carrying said casing, the pivotal support to which said arms are connected, and the springs for elevating the casing, substantially as described.

34. In a time-stamp, the combination, with the printing mechanism and the casing therefor, of the parallel arms carrying said casing, the pivotal support to which said arms are connected, the spring for elevating the casing, the inking-roller, the lever carrying the

same, pivoted on the arms, and the link connected to said lever for moving the inking-roller, substantially as described.

35. In a time-stamp, the combination, with the printing mechanism and the casing therefor, of the parallel arms carrying said casing, the pivoted support to which said arms are connected, the spring for elevating the casing, the inking-roller, the lever carrying the same pivoted on the arms, the link connected to said lever for moving the inking-roller, and the spring for holding the roller in contact with the types while passing over the same, substantially as described.

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(No Model.) 2 Sheets—Sheet 1.

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TIME METER FOR ELECTRIC LIGHTING SYSTEMS.

No. 488,107. Patented Dec. 13, 1892.

Fig. 1.

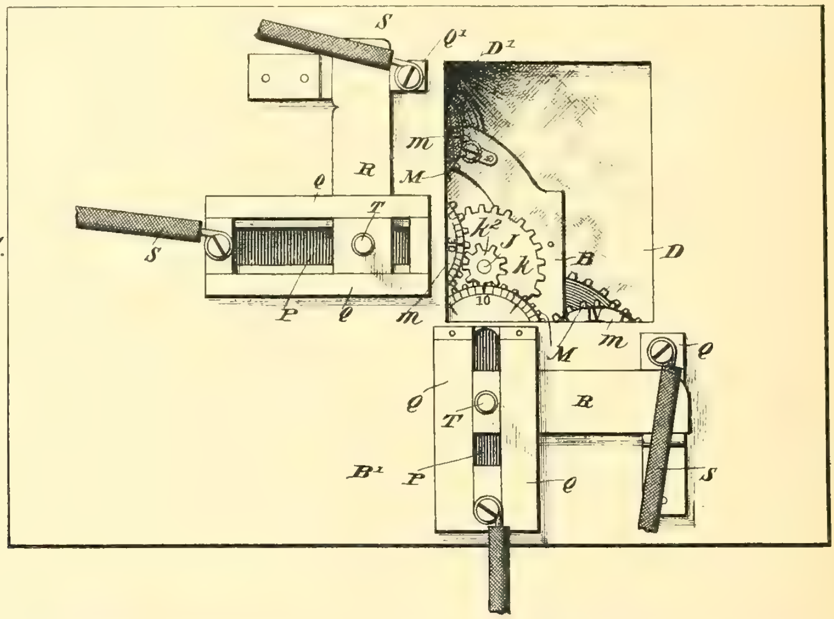


Fig. 2.

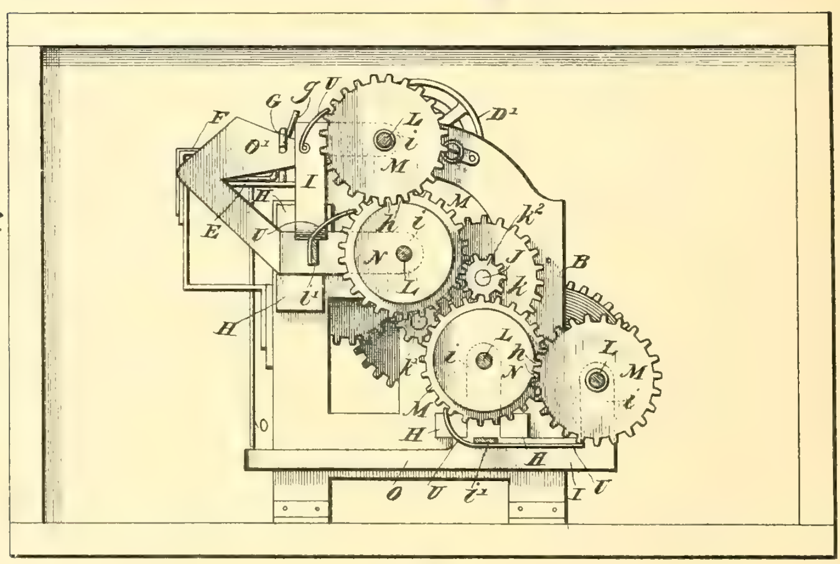
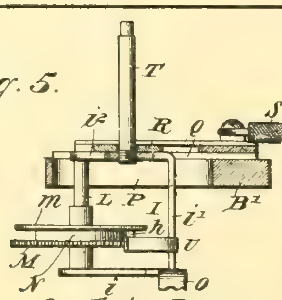


Fig. 5.



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TIME METER FOR ELECTRIC LIGHTING SYSTEMS.

No. 488,107. Patented Dec. 13, 1892.

Fig. 3.

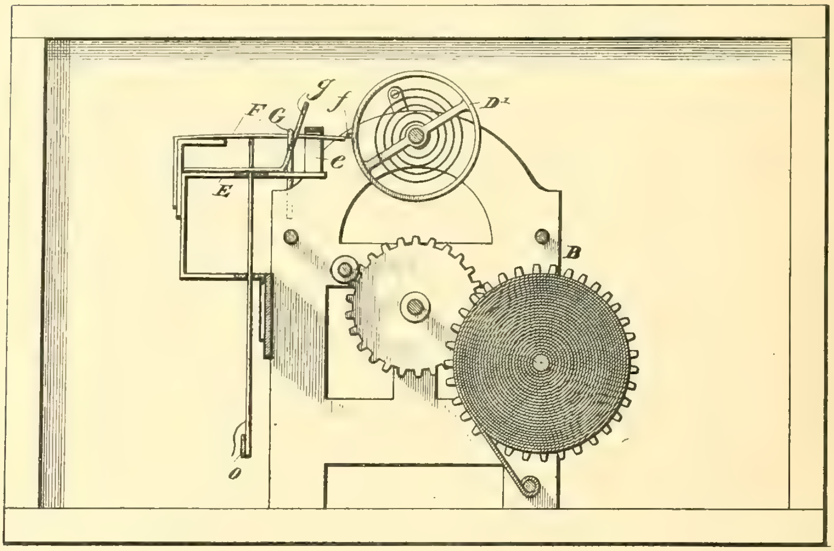
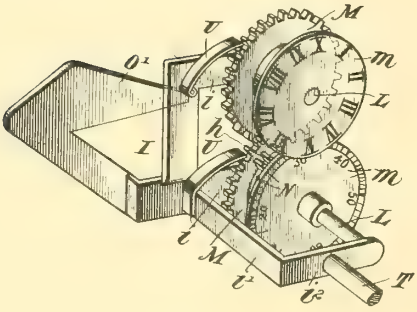


Fig. 4.



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UNITED STATES PATENT OFFICE.

JUDSON O. BALL, OF MOUNT PLEASANT, IOWA.

TIME-METER FOR ELECTRIC-LIGHTING SYSTEMS.

SPECIFICATION forming part of Letters Patent No. 488,107, dated December 13, 1892.

Application filed February 20, 1892. Serial No. 422,261. (No model.)

To all whom it may concern:

Be it known that I, JUDSON O. BALL, a citizen of the United States, residing at Mount Pleasant, in the county of Henry and State of Iowa, have invented a new and useful Time-Meter for Electric-Lighting Systems, of which the following is a specification.

This invention relates to time-meters, and is designed to be especially used in connection with electric-lighting systems in which it is important to know the exact time the lights are burning. This meter may also be used in connection with gas, water, or steam power for determining the length of time the power was in use by connecting the device with the cut-off devices for such power; but, as stated, the main object of this invention is to provide a cheap and simple device for producers as well as consumers of electric lights, which device will accurately and automatically register and measure the time such lights are severally and collectively in use, being designed to indicate the length of time one light or a series of lights burns, and can also time two or more series and keep the time of each series of lights distinct and separate. To this end it is the main object, also, to simplify and improve the construction of similar devices.

With these and other objects in view, which will appear as the nature of the invention is better understood, the same consists in combining with an ordinary clock mechanism single or separate adjustable time-registering devices, which are so regulated that the closing of the electric circuit releases the mechanism of the clock and starts the register or registers and the opening of the same, which extinguishes the lights, stops the timekeeper, or at least the registering device thrown out of engagement with the clock.

In the accompanying drawings, Figure 1 is a front elevation of a clock mechanism provided with an attachment as contemplated by this invention. Fig. 2 is a vertical sectional view in front of the clock-frame. Fig. 3 is a similar view taken centrally therethrough. Fig. 4 is a detail in perspective of one of the sliding registering devices. Fig. 5 is a detail sectional view illustrating the connection of one of the sliding switches with one of said registering devices.

Referring to the accompanying drawings, A represents a suitable casing, in which is located and mounted an ordinary clock mechanism B, said casing being inclosed and capped by the cover B′, having an ordinary face or observation opening D, by means of which the registering devices may be easily seen. Secured to the clock-mechanism frame, to one side of the balance-wheel D′, which projects slightly without the same, is a supplemental attachment arm or plate E, which is provided with the yoke *e*, which receives and accommodates the inwardly-extending leaf-spring F. Said leaf-spring F is secured at one end to said arm and projects inward under the yoke *e*, beyond the inner edge of said arm and in close proximity to the periphery of the balance-wheel D′, and in its normal position, as held by the upwardly-extending spring-arm G, is designed to be engaged by the stop stud or pin *f*, secured in the periphery of said balance-wheel and which engages over the outer end of said spring when the balance-wheel is away from its center of motion, so that when said spring is thrown out of the travel of said stop stud or pin the balance-wheel will immediately begin to oscillate and start the clock. The upwardly-extending spring-arm G is adapted to work over the inclined spring guide-arm *g* and is adapted to normally hold the leaf-spring F in the path of the travel of said balance-wheel stud, as stated, and when it is desired to start the clock mechanism the said spring is thrown out of the path of travel of said stop stud or pin by the registering devices to be presently described. It may be noted that instead of employing a stop stud or pin the said balance-wheel may be provided with a notch engaged by the free end of the spring F or a pin in said spring, according to the option of the manufacturer.

The front of the clock-mechanism frame is provided with the guide-blocks H, which are designed to accommodate the sliding and adjustable time-registering devices I, which are adapted to be slid over the face of said frame between said guides by the electric switch or cut-off devices and be thrown into mesh with the timekeeper when the circuit is regulated by said cut-offs or switches. Mounted upon a stub-shaft J, projecting from said frame-

work, is the cog-wheel k, meshing with the hand-arbor pinion k' and itself provided with a pinion k^2, which engages the registering devices as they are thrown in contact therewith. Such construction is used; but it may be noted that the said registering device may be thrown into direct mesh with the hand-arbor pinion. Each of the registering devices I comprises a suitable frame having the projecting supporting-arms i, each of which carries the stub-shafts L, and one of which arms is adapted to slide within the guides H, located upon the clock-mechanism frame, to allow the said device to be thrown in and out of gear with the clock mechanism. The said registering-device frame is further provided with the outwardly-extending arm i', to the top of which is secured the cap-plate i^2, the outer end of which receives the outer end of one of said stub-shafts and is designed to be connected with the switch devices, to be presently noted. The registering devices are provided with the indicating cog-wheels M, each of which carries the indicating-dials m to indicate hours and minutes or any period of time desired; but they do not mesh with each other. The cog-wheel M upon the stub-shaft carried by the sliding arm of said registering device is designed to be thrown in and out of mesh with the pinion k^2 when the electric cut-off or switch is moved, and said wheel also carries the disk N, provided with the fingers h, which at every revolution of said cog-wheel carrying the same are designed to engage the adjacent cog-wheel upon the adjacent stub-shaft and move the same one point to register one revolution of the adjacent dial to indicate one hour or every twelve hours, as the case may be and according to whether the device is geared directly to the hour or minute hand arbor. The said registering devices, which may be arranged in any number upon the clock-mechanism framework, according to the number of different lights or series of lights to be independently and collectively timed, are provided with suitable devices for releasing the balance-wheel when in gear with the clock mechanism or to allow the same to be caught and held when not in use. It will of course be seen that the first registering device thrown into engagement with the clock mechanism sets the mechanism off, while the other devices may or may not be used at the time, and that the last registering device thrown out of engagement with the mechanism causes the leaf-spring F to be released and hold the clock mechanism.

As illustrated in the drawings, two registering devices are employed, one of which registering devices, which is located in such position as to slide to and away from the leaf-spring F, has connected therewith an extended arm O, passing through the attachment arm or plate E and designed to work between said arm and the leaf-spring F, so that as the said registering device or attachment is thrown in mesh with the pinion k^2 the spring F will be thrown out of the path of the balance-wheel to release the same, while the opposite will be the effect when the registering device is slid out of gear. The other registering device I, which moves in a line with the disposition of said leaf-spring F, is provided with an inclined head O′, the upper edge of which bears under the upwardly-extending and downwardly-pressing spring-arm G, and as said device is thrown in connection with the clock mechanism said inclined head moves under the said spring-arm, which rises up and over said inclined head and over the inclined guide-arm g, and thereby rises sufficiently far to allow the spring F to also rise and disengage itself from the balance-wheel stud, while, on the contrary, the opposite operation allows the spring F to be forced down by the arm G and into engagement with the balance-wheel. Various mechanical devices will be found expedient to release the clock mechanism by the sliding registering devices that will be apparent. The cap-plates i^2 of each of the registering devices I are designed to work in the slots P, formed in the cap or cover B. Mounted over said slots P are the electric-switch-guide plates Q, carrying the sliding cut-offs R, which are designed to close and open the circuit of the wires S, connected with said guide-arms, in which said cut-offs work, and the contact-plates Q′, as will be apparent. The said switch-arms R are controlled by the posts T, passing therethrough and connected with cap-plates i^2, so that when the electric circuit is closed the movement will throw the registering device in mesh with the clock mechanism, while at the same time releasing the clock mechanism. The various switches control the several registering devices connected therewith, and the operation of all is identical; but, as previously stated, it may be again noted that it is immaterial whether one, two, or more registering devices are used at the same time, inasmuch as the construction is such as to allow a simultaneous registering of all the connections used.

It is of course to be seen that suitable leaf-springs U bear upon said cog-wheels M and steady the same and insure accuracy in registering.

While I have described, specifically, the construction of the herein-described time-meter, I would nevertheless have it understood that I do not wish to exclusively confine myself to such details, but reserve the right to make such changes or modifications as may be found necessary without departing from the spirit of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a time-meter, the combination, with an ordinary clock mechanism, of a movable registering device and a cut-off connected with said registering device and adapted to

throw the same into engagement and out of engagement with the clock mechanism when the electric circuit is closed or opened, respectively, substantially as set forth.

2. In a time-meter, the combination, with the balance-wheel and the hand-arbor of a clock mechanism, having a pinion, of a sliding registering device mounted to slide upon the clock-mechanism frame and means for engaging and disengaging the said registering device with said arbor-pinion and stopping and starting the balance-wheel at a point away from its center of motion, substantially as set forth.

3. In a time-meter, the combination, with the clock mechanism having a balance-wheel and a hand-arbor provided with a pinion, of a spring-arm secured adjacent to said balance-wheel and adapted to normally engage and check the same at a point away from its center of motion, a registering device mounted to slide upon the clock-mechanism frame and connected with said spring-arm, and a sliding cut-off or switch connected with said registering device, substantially as set forth.

4. In a time-meter, the combination, with a balance-wheel and a hand-arbor of a clock mechanism, said arbor having a pinion, of a spring-arm adjacent to said balance-wheel and adapted to normally engage and check the same at a point away from its center of motion, registering devices mounted to slide upon the clock-mechanism frame to and from said arbor-pinion, and connected independently with said spring-arm, and sliding cut-offs or switches connected with said registering devices, substantially as set forth.

5. In a time-meter, the combination, with the clock mechanism having a balance-wheel and a hand-arbor provided with a pinion, of a spring-arm secured adjacent to said balance-wheel and adapted to normally engage and check the same at a point away from its center of motion, a registering device mounted to slide upon the clock-mechanism frame and provided with opposite stub-shafts, dial-carrying non-meshing cog-wheels mounted on said shafts, a disk carried by one of said cog-wheels and provided with fingers engaging the other cog-wheel at every revolution, said registering device being connected with said spring-arm, and a sliding electric switch connected with said registering device, substantially as set forth.

6. In a time-meter, the combination, with the box or casing having a slot and the clock mechanism having a balance-wheel and a hand-arbor provided with a pinion, of a spring-arm adjacent to said balance-wheel and normally engaging and checking the same at a point away from its center of motion, a registering device sliding upon the clock-mechanism frame and provided with opposite stub-shafts, dial-carrying non-meshing cog-wheels mounted on said shafts, a disk carried by one of said cog-wheels and provided with fingers engaging the other cog-wheel at every revolution, a cap-plate working in said slot, and a sliding electric switch working over said slot and connected with said cap-plate, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JUDSON O. BALL.

Witnesses:

L. G. PALMER,

HENRY MELCHER.

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W. L. BUNDY.

WATCHMAN'S TIME RECORDER.

No. 488,687. Patented Dec. 27, 1892.

Fig. 1.

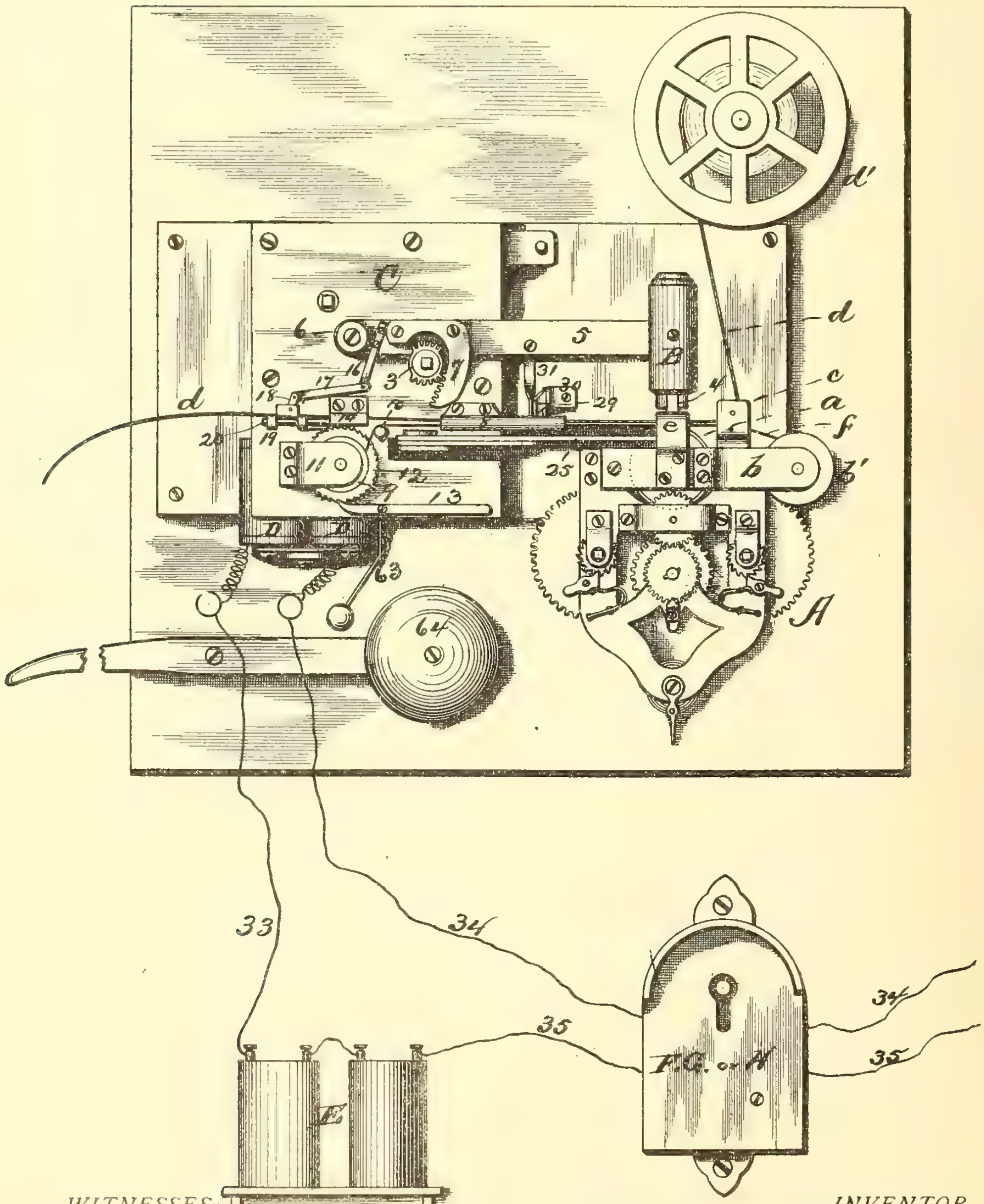

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Fig. 2

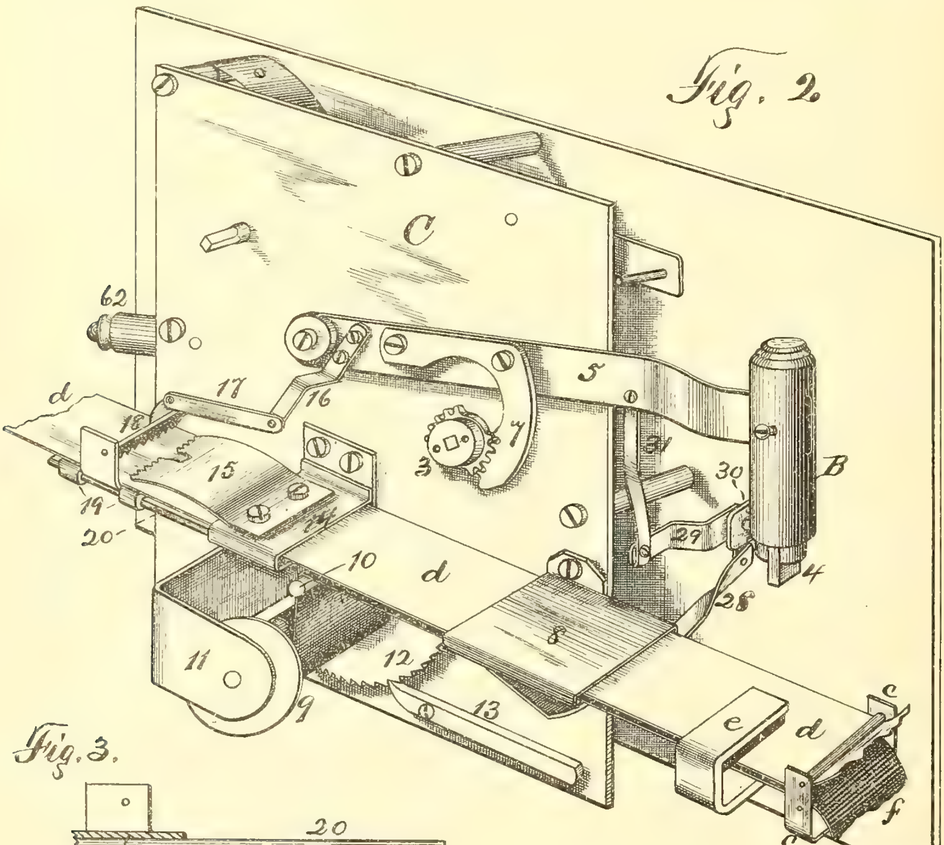
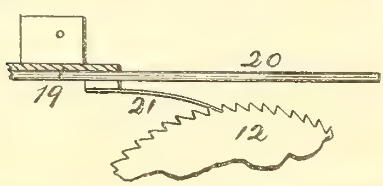


Fig. 3.



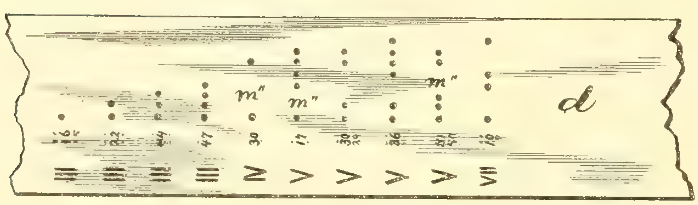


Fig. 6.

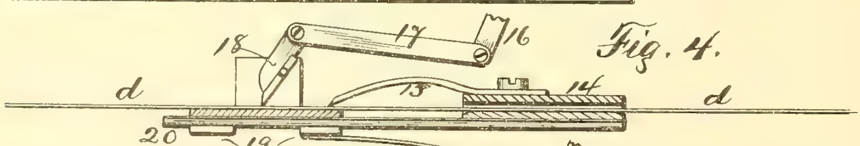


Fig. 4.

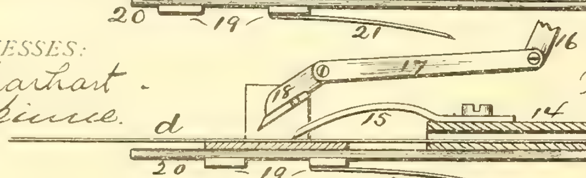


Fig. 5.

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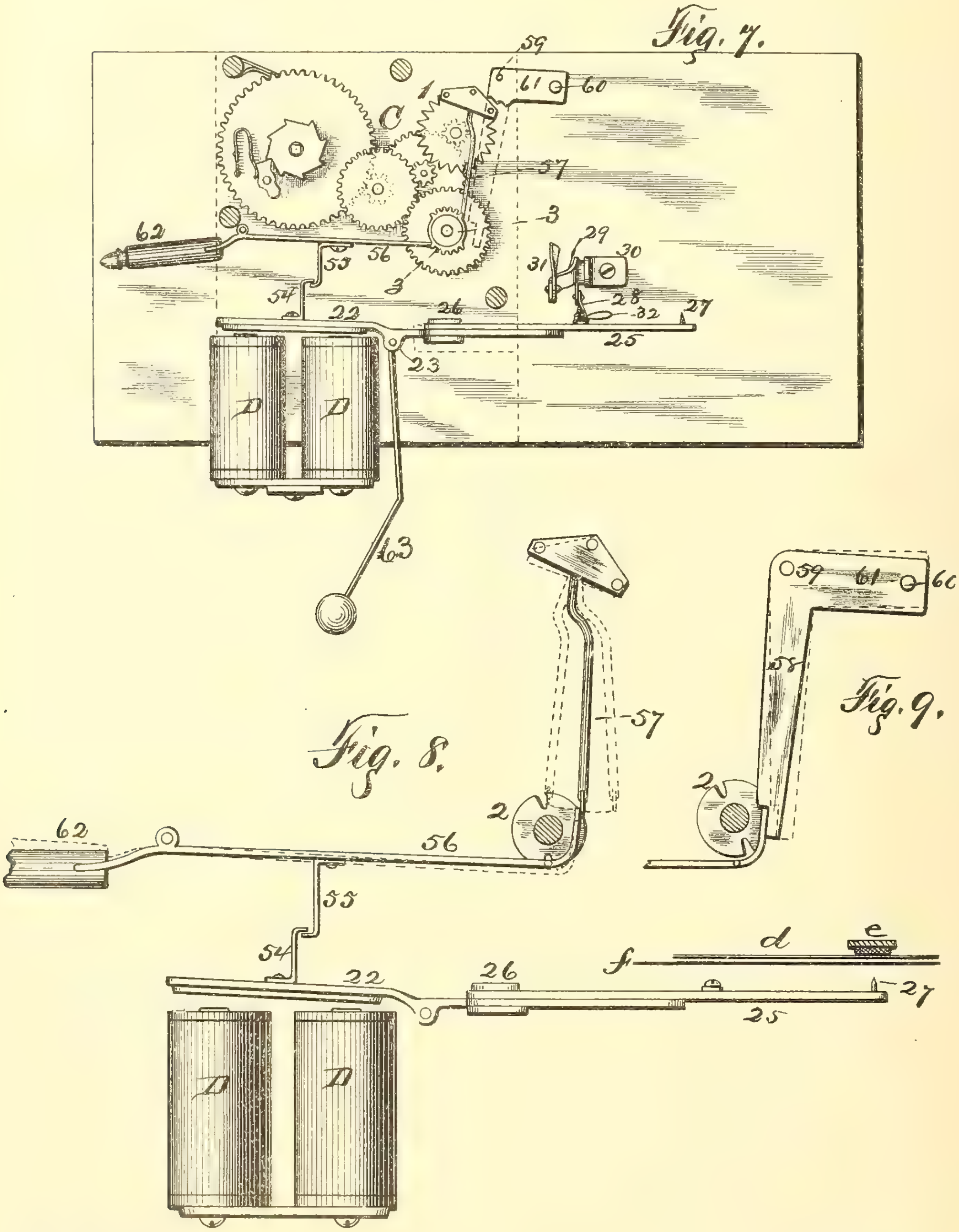

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WATCHMAN'S TIME RECORDER.

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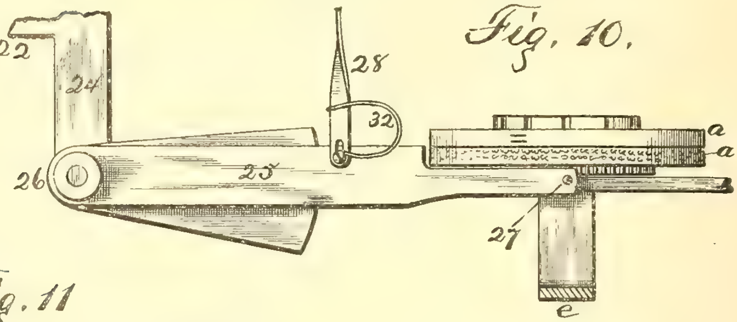

Fig. 10.

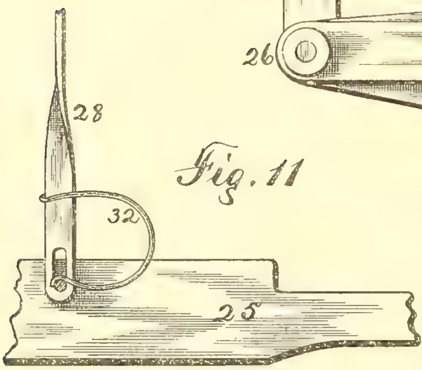

Fig. 11

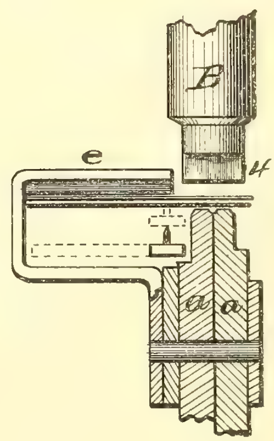

Fig. 12

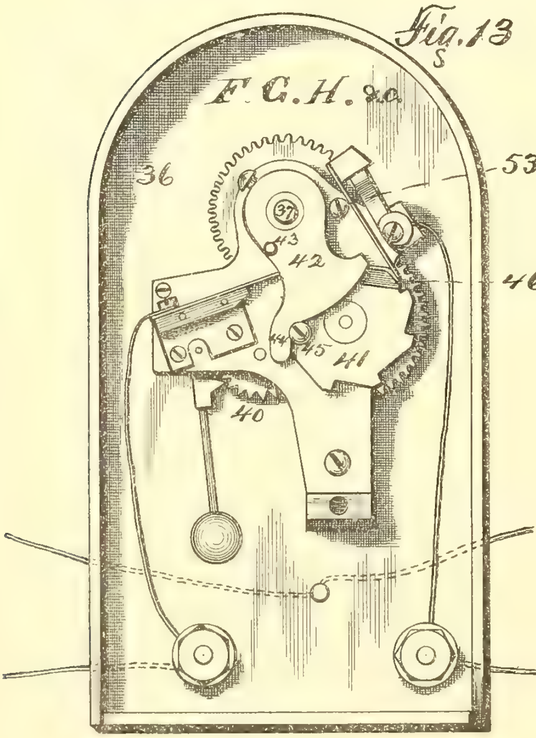

Fig. 13

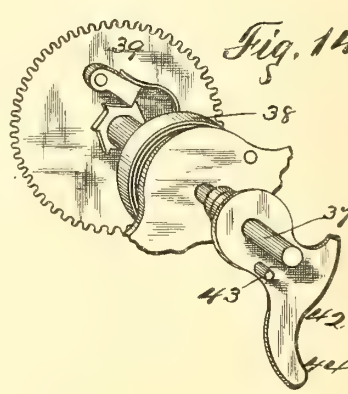

Fig. 14

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WATCHMAN'S TIME RECORDER.

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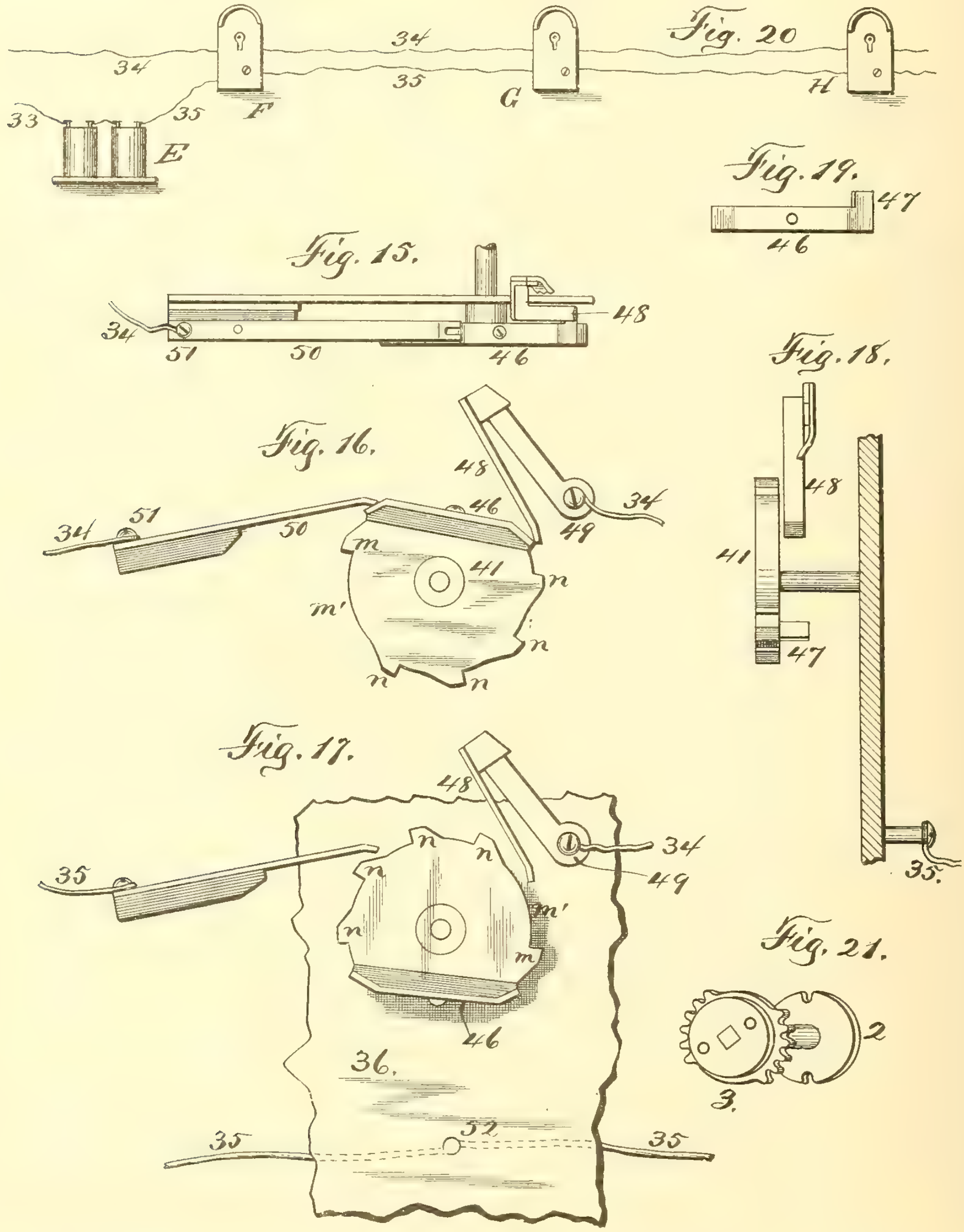

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UNITED STATES PATENT OFFICE.

WILLARD L. BUNDY, OF BINGHAMTON, NEW YORK, ASSIGNOR TO THE BUNDY MANUFACTURING COMPANY, OF SAME PLACE.

WATCHMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 488,687, dated December 27, 1892.

Application filed October 19, 1891. Serial No. 409,118. (No model.)

To all whom it may concern:

Be it known that I, WILLARD L. BUNDY, of Binghamton, in the county of Broome, in the State of New York, have invented new and useful Improvements in Watchmen's Time-Detectors, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to watchmen's time recorders, adapted to record the time of the watchman's visits to the different stations throughout a factory, and to that particular class in which all of the stations are located, in open circuit, upon two wires, and in which the record is made of the time when the circuit is broken at any station, such recording apparatus being located in the office of the firm, or at some fixed central point.

My object is in the first instance to avoid the multiplicity of wiring necessary where each station is separately wired to the central station, by locating all of the stations upon two wires in open circuit, which passes through all of the station boxes, and when such circuit is broken at any station by the operation of its key, the combined action of the station mechanism and its motor, and of the central recording mechanism, will record the number of the station, by signs, symbols or characters, and the hour and minute when the key was turned at the station, such record being made upon a continuous strip of paper, by means of an impression hammer and a printing ribbon, said paper and ribbon being automatically fed along through under the impression hammer: means being also provided in the station box to break the circuit and make it a fixed number of times, so that a record of the number of the station is made at the same time that the time is recorded; and in which each station while being operated, forms its own circuit with the battery and recording mechanism independent of the stations beyond it, such circuit being intermittent by reason of a rotating stepped cam, and a spring finger making a contact with the steps thereon, successively, and breaking it between said steps.

My invention consists in the several novel features of construction and operation hereinafter described and which are specifically set forth in the claims hereunto annexed. It is constructed as follows, reference being had to the accompanying drawings, in which

Figure 1, is a front elevation of the recording apparatus, the battery and a single station. Fig. 2, is a plan perspective of the impression and paper feed mechanism. Fig. 3, is a detail of the mechanism for rotating the ribbon spool and feeding the ink ribbon. Fig. 4, is a sectional detail, partly in side elevation, of the paper feeding mechanism, in its normal position. Fig. 5, is a like view of the same, showing the feed bar drawn back, ready to engage with the paper to feed it forward. Fig. 6, is a plan of a part of the paper strip. Fig. 7, is a front elevation of the electro-magnet and the motor mechanism released intermittently by the operation of the armature, the face plate shown in Fig. 2, and the paper feed and hammer being removed. Fig. 8, is a detached plan elevation of the electro-magnet, armature, printing or impression bar connected to the armature and actuated thereby, and the trip mechanism for releasing the motor to operate the impression hammer, the operation of the armature, and to lock the motor after each impression. Fig. 9, is a detached detail for the mechanism for locking the trip bar while the motor is operating the impression hammer. Fig. 10, is a top plan view of the time wheels and station indicator bar—detached. Fig. 11, is a detail of the vibration take up between the connecting rod and the station indicating bar. Fig. 12, is a vertical sectional detail of the time wheels, impression hammer, impression pad, and vibratory marker, the dotted lines indicating its elevation, and also the horizontal dotted lines indicating the extent of the swing thereof. Fig. 13, is a front elevation of a station box, with the cover removed. Fig. 14, is a plan perspective of the motor drive gear, key shaft, motor spring and the swinging finger, and stop combined, secured upon the shaft, all in, the station box. Fig. 15, is a top plan of the rotating cam and the contact fingers in contact with the insulated contact plate upon the cam. Fig. 16, is a front elevation of the same parts shown in Fig. 15, showing these parts all in open circuit upon the wire, and ready to be operated by the motor to break the

circuit when the key is inserted and turned. Fig. 17, is a front elevation of the rotating cam, partially rotated, and the left hand spring contact finger out of contact, between two of the cam teeth upon the cam, as well as the other contact finger, and the negative wire at the bottom, through which a circuit is made every time the left hand finger makes a contact with one of the cam teeth. Fig. 18, is an elevation of Fig. 17, looking at it from the right, showing the finger on the right out of contact with the cam. Fig. 19, is a detached top plan view of the contact plate secured upon the rotating cam, showing its side projection. Fig. 20, is an elevation showing a battery and several stations upon a single circuit. Fig. 21, is a plan perspective of the segmental gear and the stop wheel upon the same shaft.

"A" is a clock, shown in the drawings as erected upon a suitable backing, and (a) are time wheels, having figures or type upon their peripheries corresponding to hours and minutes, said wheels being connected in any ordinary manner to the clock work, so that they are at all times synchronous with the time of the clock work. A bracket (b) in front and a like one in rear, (not shown) together carry the ribbon spool (b') between them. Vertical and parallel arms (c) (front and rear) carry a guide roller, under which the paper strip (d) passes from the reel (d'). An impression pad (e), the form of which is best seen in Fig. 12, is mounted and extends over the top of the ribbon and paper.

"B" is the impression hammer, comprising a hammer body, slotted across the bottom to receive a piece of rubber or other elastic substance (4), which constitutes the working face of the hammer, and this body is adjustably mounted upon the bar (5) which is pivotally mounted upon the outer casing of the motor "C," at (6).

"C" is the impression hammer motor, comprising a spring wheel, and a train of gearing actuated thereby, to operate an escapement (1) (Fig. 7) and to rotate a trip wheel (2), and also the lifting gear (3), provided with segmented gear teeth on two opposite sides, and with intermediate smooth spaces, as shown in Figs. 1, 2 and 7. A rack bar (7) concentric with the gear (3), and provided with the same number of teeth as each toothed segment of the gear, is secured to the hammer bar, so that when the motor rotates said gear over to the left, (Fig. 2) the hammer is lifted, until the segment and rack become disengaged, when the hammer falls by gravity, its face striking upon the paper strips (d) directly on the printing line of the time wheels, and makes an impression upon the under side of the paper strip, the ink ribbon (f) lying between the said strip and the time wheels. From the printing line the paper and ribbon pass through a guide (8) mounted upon the casing, and then the ribbon is deflected over a roller (10), (Fig. 2) down onto the spool (9), mounted upon a shaft having its bearings in the spring bracket (11), and in the motor casing, said shaft being provided with a rack-gear (12), and (13) is a gravity pawl pivoted on said casing and engaging with said gear and preventing any backward rotation of the spool. The paper strip also passes along through a guide (14), supported upon the casing. A spring finger (15) is secured upon this guide, in such manner that its toothed free end engages with and prevents any backward movement of the paper.

To feed the paper strip forward, I secure an arm (16) to the hammer bar, and pivotally connect a connecting rod (17) to said arm, and to an arm upon a rocking multiple toothed dog (18), which dog is mounted on trunnions in the vertical sides of a slide (19). This slide is mounted upon guide rods (20) extending from the guide (14), and a bar, (not shown) extends across under the paper and forms the bottom of the slide the support of the paper, and the bearing against which the dog teeth bear. As the hammer bar raises, it lifts the arm (16), draws upon the connecting rod (17), first rocking the dog (18) and releasing the teeth from the paper, then drawing the slide (19) back toward and nearly to the end of the finger (15). Then when the hammer bar is released, and falls, the first effect as to this feed mechanism, is to rock the dog (18) over until it engages firmly with the paper and then to shove the slide away from the finger (15), drawing the paper along with it, and feeding it a distance equal to the throw of the feed dog, as for instance, as shown in Fig. 6, from one record to the next.

In Fig. 3 I show my ribbon feed mechanism, which is in addition to the paper feed mechanism. A spring push pawl (21) is secured to the slide (19), underneath, its point engaging with the rack gear (12), in such manner that when the slide is drawn back by the raising of the hammer bar, the pawl will rotate the spool a distance equal to the draw of said slide, and then as the hammer falls, the pawl will snap over the rack teeth into engagement with another tooth.

Referring to Figs. 7, 8 and 10, I now describe my station indicating mechanism. "D" is an electro-magnet, of which (22) is the armature pivotally mounted at (23), thence extending to the right, with an offset (24) (Fig. 10) and thence to the right again creating a support for the impression bar (25), which is pivotally connected to the armature at (26), and extends over far enough to bring the printing stud or type (27) into the printing line. Then as the hammer bar rises by means of the connecting rod (28) (Fig. 2) the bell crank (29) pivoted upon the stud (30), and the lever (31) pivotally connected to the bell crank and to the bar (5), said bar is swung outwardly upon the pivot (26), bringing the stud (27) over to the outer edge of the paper; and as the hammer bar falls, said bar is drawn

back to its normal position as shown in Fig. 10. This swings the impression bar so that it is capable of making imprints at different points, as shown in Fig. 6, as hereinafter described; and the spring (32) takes up all concussion incident to the swing, return or stopping. "E" is the battery; (33) the wire connecting it to the electro-magnet; (34) is the wire leading from the magnet through all of the stations, "F," "G," "H" &c. (Fig. 20); and (35) is the return wire leading back through all of them to the battery; the ends of the wires on the right in Fig. 20 being connected together, so that all of the stations are upon these two wires, and in open circuit normally.

As the station mechanisms are in the main, precisely alike, I will only describe one, pointing out the point of difference, which lies in a single variance of form of one part, such variation accomplishing a variance of operation whereby the number of each of the stations is indicated. Upon the casing (36) (of ordinary construction), I mount the station mechanism, consisting of a front and back plate, a key shaft (37), a spring (38) wound thereon, a drive gear (39) connected to the shaft by the spring pawl mechanism shown in Fig. 14, a train of clock work gearing whereby the escapement wheel (40) is rotated, and its pendulum actuated, and whereby the cam toothed gear (41) is rotated. A finger (42) is secured upon the key shaft, provided with a stud (43) with which the bit of the key engages, and with a horn (44) which is normally in engagement with the pin (45), upon the gear (41) thereby preventing said gear from rotation while in such engagement. Upon one side of this gear the contact plate (46) is secured and insulated from the remainder thereof, having also the sloping ends and a plane intermediate surface, as shown in Figs. 16 and 17, and further provided with a side arm (47), as shown in Fig. 18. Upon the front plate of the frame, I insulate and secure the contact finger (48), which is normally in contact with one end of the plate (46), through the binding screw (49) and wire (34). Opposite this I suitably insulate and secure upon the front plate of said frame, the spring contact finger (50), which is normally in contact with the other end of the plate (46) through the binding post (51), and the wire (34); so that these two fingers and said plate normally create a connection between the sections of the wire (34). The wire (35) is connected to the back of the box casing by a screw (52), but is not insulated therefrom, and as the gear (41) is not insulated, the main portion aside from the plate (46), can be brought into circuit with the wire (34), and this is done as follows: When the key is inserted and turned, the finger (42) is swung around until it strikes the stop pin (53), releasing the gear (41), which then rotates freely, and the spring also operates to throw the finger back to its normal position. When the contact fingers (48) and (50), by the rotation of the gear (41) become disconnected from the plate (46) and the arm thereon the circuit of the two parts of the wire (34) is broken. Then as the spring contact finger (50) comes into engagement with the first cam tooth of said gear, a new circuit is made, during such engagement, through the body of said gear its arbor, the casing plate (36), binding screw (52) and that part of the wires (34) and (35) upon the left, (Fig. 13) see also Figs. 1 6 and 17. Each time that a circuit is thus made by the contact finger (50), the armature of the electro-magnet D is operated and this operates to throw up the impression bar and by bringing the type stud (27) into contact with the ribbon, and thus make an impression or imprint of the type character or sign, upon the under side of the paper strip. While the gear (41) is thus rotating and the armature (22) is being vibrated by the circuits made and broken by the contact finger, successively making and breaking contact with the cam teeth thereon and the push bar (28) is actuated as aforesaid to swing the impression bar (25) laterally upon its pivot (26), and inasmuch as said bar or the type-stud thereon is actuated vertically by the vibration of said armature, it follows that each time it is so vibrated said stud makes an imprint or mark upon the paper strip, and that the successive imprints upon the paper will be in a line across the paper, and that their number will be the same as the number of the cam teeth on said gear (41); and that their arrangement with reference to each other is wholly controlled by the arrangement of the cam teeth, or the manner in which they are grouped on either side of the space (m'), as will be seen by reference to Fig. 6. Thus in Fig. 16, the cam gear by the tooth (m), will make a dot as shown in Fig. 6, the space (m') will create a space (m'') on the paper strip (Fig. 6) and then the four successive teeth (n), being arranged equi-distant from each other, will consequently make four imprints upon the paper, and thus record upon the paper that station (14) was operated, and the imprint of the time wheels shows that it was done at five o'clock and seventeen minutes. By omitting all of the teeth (n), the single tooth (m) will record the operation of the station (1); by making the gear with two teeth (m), it will record the operation of station (2); one tooth (m) a space, and one tooth (n) will record station (11); two teeth (m) and two teeth (n), will record station (22) and so on. Inasmuch as the body of this cam gear is not insulated, and the wire (35) is not insulated from the back of the casing, it follows, that each time the finger (48) makes a contact with a cam tooth, a circuit is made through the cam gear, its shaft, the casing back, and the wire (35) on the left, and the wire (34) on that side through the battery and electro-magnet, entirely inde-

pendent of the extensions of the wires (34) and (35) on the right, which circuit is broken as the finger breaks contact with each cam tooth, and is finally broken when both of the fingers make contact with the contact plate upon the gear as in Fig. 16. As will be seen by Fig. 18, the finger (48) does not touch the gear while it is in rotation, and only makes contact with the arm thereon at any time.

By reference to Fig. 8 it will be seen that when the armature is first depressed, the standard and lip (54) thereon being normally in engagement with the arm and lip (55) upon the weighted and pivoted lever (56) will draw down the inner end of said lever, pulling the pin out of engagement with the notch in the stop wheel (2) upon the shaft, which carries the lifting gear (3) (Fig. 7) releasing said wheel to be rotated by the motor, and at the same time release the pendulum (57) of the escapement (1), from engagement with the lever, so that it can vibrate as indicated by the dotted lines, and at the same time the pawl (58) pivoted at (59), and provided with a weighted or counter-balancing arm, will swing in and catch the inner end of the lever and hold it out of engagement with the stop-wheel (Fig. 9) until the hammer bar, rising, engages with the stud (60) upon the arm (61) of the pawl and forces said pawl and lever apart, when the weight (62) will raise the inner end of this lever, so that it will first stop the pendulum and escapement, and then the stop wheel, just at the time when the hammer has been raised clear of the paper, by the engagement of the first tooth of the gear segment brought around by such half rotation, with the rack bar on the hammer bar (5). It will be seen that the striker (63) is secured to the armature (22), and vibrates with each movement thereof so that it strikes the bell (64) and sounds an alarm each time that a circuit is made by the finger (50) upon any of the points of the stepped cam and said armature is thereby vibrated as aforesaid.

What I claim and desire to secure by Letters Patent is,

1. In a watchman's detector, a segmental gear rotated by a motor, a hammer mounted upon a bar, a rack bar upon said hammer bar, with which said gear engages, in combination with an arm secured to the bar, a slide, a toothed pawl pivotally mounted in said slide, and a connecting rod connecting said pawl to said arm.

2. In a watchman's detector, a segmental gear rotated by a motor, a hammer mounted upon a bar, a rack bar upon said hammer bar with which said gear engages, in combination with a swinging impression bar, a bell crank lever, a rod connecting it to said bar and a connecting rod between said helve and bell crank lever.

3. In a watchman's detector, a motor, a hammer bar raised thereby, a slide through which the paper strip passes, a toothed pawl pivotally mounted in said slide, and an arm secured to said hammer bar, and a connecting rod between said arm and said pawl, and a push pawl secured to said slide, in combination with the ribbon spool, and the rack gear thereon, with which said push pawl engages.

4. The combination with the motor and the notched stop wheel, upon its shaft, of a lever pivotally mounted and adapted to engage with one notch of said wheel, and the armature of an electro-magnet connected to said lever.

5. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted and adapted to engage with one notch of said wheel, and with which said pendulum normally engages, and the armature of an electro-magnet connected to said lever.

6. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted and adapted to engage with a notch on said wheel, and with which said pendulum normally engages, the armature connected to said lever and the swing pawl engaging the end of said lever when released from said wheel.

7. The combination with the motor, the notched stop wheel upon its shaft, and the motor escapement pendulum, of a weighted lever pivotally mounted, and adapted to engage with a notch on said wheel, and with which said pendulum normally engages, the armature connected to said lever and the swing pawl engaging the end of said lever when released from said wheel, and the hammer helve adapted to engage with said swing pawl and disengage it from said lever.

8. In a watchman's detector, the combination of a weighted lever pivoted upon the casing, and adapted to engage with the stop wheel, the armature of an electro-magnet connected thereto and a swing pawl engaging with the end of said lever when disengaged from the stop wheel by the operation of the armature.

9. In a watchman's detector, a weighted lever pivoted upon the casing, a stop wheel with which it engages, a swinging pawl engaging with said lever when disengaged from said wheel, and an armature normally engaging with said lever, and operating to disengage it from said wheel, and an impression bar secured to said armature, and vibrated vertically by the vibration of the armature.

10. In a watchman's detector, a weighted lever pivoted upon the casing, a stop wheel with which it engages, a motor operating it, a swinging pawl engaging said lever when disengaged from said wheel, and an armature normally engaging said lever and operating to disengage it from said wheel, and an impression bar pivoted upon the armature and

swung vertically by the vibration of the armature.

11. In a watchman's detector, a battery, an electro magnet, an armature, and an impression bar pivoted upon the armature and laterally movable thereon and vibrated vertically by it, in combination with type wheels synchronous with a clock, the paper strip, the ink ribbon, and the vertically operated impression hammer.

In witness whereof I have hereunto set my hand this 11th day of September, 1891.

WILLARD L. BUNDY.

In presence of—

HOWARD P. DENISON,

C. W. SMITH.

(No Model.)

W. H. DOUGLAS.

STOP WATCH.

No. 488,710. Patented Dec. 27, 1892.

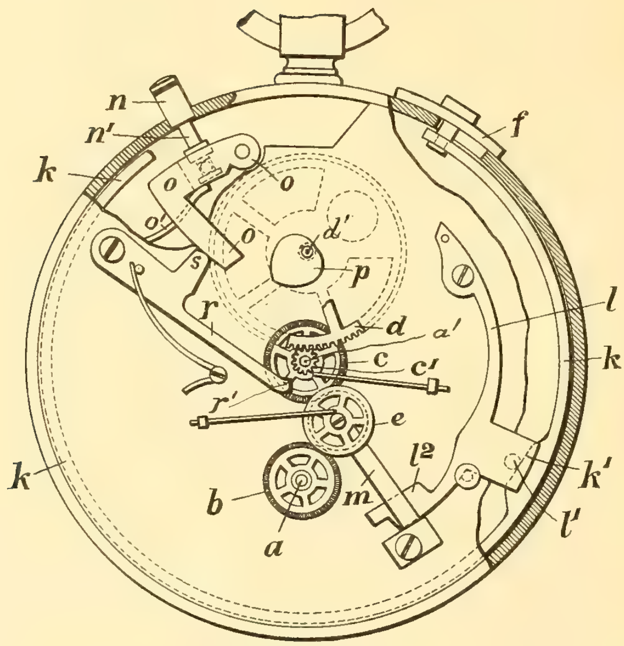


FIG. 1.

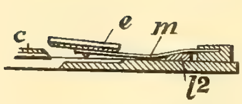


FIG. 3.

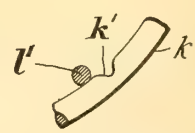


FIG. 3A.

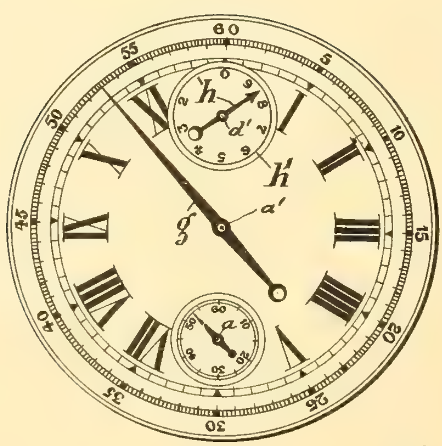


FIG. 2.

Witnesses:
Walter Allen
J. L. McPfister

Inventor.
Wm. H. Douglas.
by Herbert W. Jenner,
Attorney.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY DOUGLAS, OF STOURBRIDGE, ENGLAND.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 488,710, dated December 27, 1892.

Application filed March 12, 1892. Serial No. 424,641. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HENRY DOUGLAS, a citizen of Great Britain, residing at Stourbridge, in the county of Worcester, and country of England, have invented certain new and useful Improvements in Stop-Watches; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to stop watches; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed.

In the drawings: Figure 1 is a rear view of the stop mechanism. Fig. 2 is a front view of the watch showing the additional dials and pointers. Fig. 3 is a sectional side view of the disengaging mechanism. Fig. 3^A is a detail showing a modification of a portion of the disengaging mechanism.

To the shaft a of the ordinary seconds hand, is attached a beveled toothed wheel b; and upon the central shaft a' is attached, an additional seconds pointer g at the front of the watch, and a toothed pinion c' and a beveled toothed wheel c at the rear of the watch. A beveled toothed wheel e is journaled on a pin projecting from the flat spring m which normally holds it in gear with the wheels b and c. An additional pointer h is secured on a shaft d' at the front of the watch, and a toothed wheel d is secured on the shaft d' at the back of the watch, and gears into the pinion c'.

The shaft a is driven by any approved form of watch driving-mechanism or train and imparts a constant rotary movement to the additional pointers g and h as long as the wheel e is in gear with the wheels b and c. The pointer g is provided with a dial marked up to sixty seconds, and the pointer h is provided with a dial marked up to ten minutes, or whatever other space of time the wheel and pinion may be adapted for. An external push-piece f is provided and is connected to a rod k which is nearly a complete ring and which is journaled in the watch case. The rod k is provided with a wedge-shaped surface k', as shown in Fig. 1, or as shown in Fig. 3^A according to the thickness of the rod.

A spring lever l is secured in the case and is provided with a wedge l^2 which comes under an inclined portion of the spring m as shown in Fig. 3. The spring l is also provided with a pin l' which presses against the rod k. When the rod k is moved by the push-piece to cause the pin l' to be pressed toward the center of the watch by the wedge or incline k', the wedge l^2 raises the wheel e out of gear with the wheels b and c, as shown in Fig. 3, and disengages the pointers g and h which stop immediately without interfering with the motion of the watch.

The push-pin n is provided for setting the pointers g and h to zero before reconnecting them with the watch mechanism. In order to prevent this pin n from being pressed in when the pointers g and h are connected to the watch mechanism, a groove n' is formed on the pin n and is adapted to receive the end of the rod k which locks the pin. The pin n is pivoted to a pivoted bent lever o inside the watch, and a heart-shaped cam p is secured on the shaft d'. When the pin n is pushed in, against the pressure of the spring o', the lever o strikes the cam p and moves the pointer h back to zero. The pointer g is also moved very nearly to zero because it is connected to the pointer h by the toothed wheel and pinion.

In order to set the pointer g exactly to zero when the pin n is pushed in, a spring-actuated lever r is pivoted inside the watch and the wedge-shaped end r' of this lever is pressed between two of the teeth of the pinion c' when the heel s on the lever is released by the forward motion of the lever in setting the cam.

What I claim is:

1. The combination, with the seconds-hand shaft, of the additional seconds pointer and its shaft, the beveled toothed wheels secured on the said shafts, the connecting wheel e and its supporting spring, the pivoted spring l provided with a wedge for raising the said wheel e out of gear with the two beveled wheels, and the oscillatory bar k journaled in the periphery of the case and provided with a push-piece and an inclined-portion for operating the said spring l, substantially as set forth.

2. The combination, with the pointer h and the cam p secured on the same shaft, of a

pivoted lever adapted to set the said cam and pointer to their zero position, a push-pin n provided with a groove and adapted to operate the said lever, and the bar k journaled in the case and adapted to engage with the said groove and lock the said pin when the pointer h is connected with the watch driving-mechanism, substantially as set forth.

3. The combination, with the pointer h, the wheel d and the cam p all secured on the shaft d', of the pointer g and the pinion c' secured on the shaft a', the pivoted lever o provided with a push-pin and adapted to set the two said pointers, and the spring-actuated lever r provided with a heel s bearing on the said lever and having a wedge-shaped end adapted to be thrust between the teeth of the said pinion to insure the exact setting of the pointer g, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM HENRY DOUGLAS.

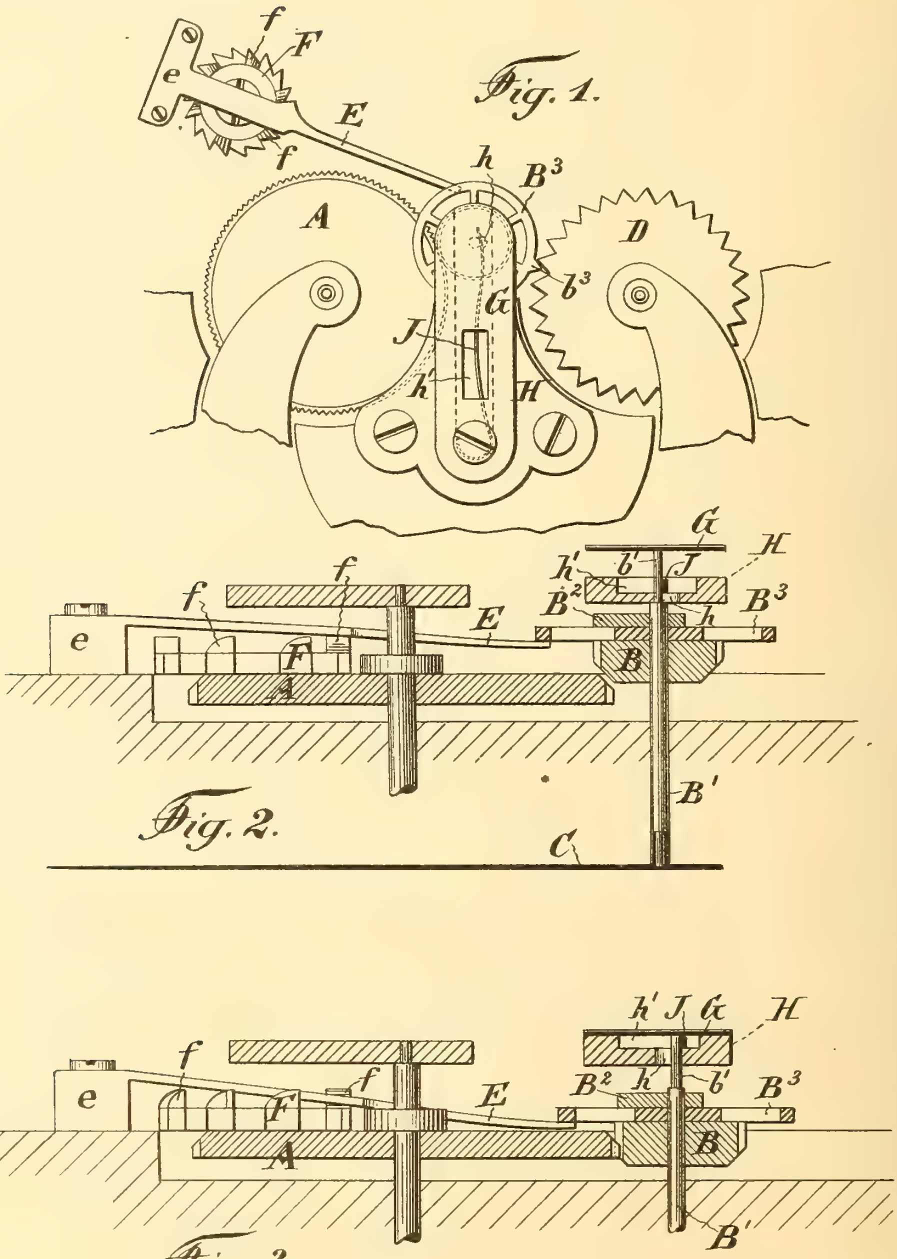
Witnesses:
GEO. CROGDON MARKS,
WILLIAM EVANS.

(No Model.)

H. JACOT-BURMANN.

STOP WATCH.

No. 489,255. Patented Jan. 3, 1893.



Witnesses

Chas H. Smith

Geo. T. Pinckney

Inventor

Henri Jacot-Burmann

per Lemuel W. Serrell

Atty.

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HENRI JACOT-BURMANN, OF BIENNE, SWITZERLAND.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 489,255, dated January 3, 1893.

Application filed September 19, 1892. Serial No. 446,278. (No model.)

To all whom it may concern:

Be it known that I, HENRI JACOT-BURMANN, watch manufacturer, of Bienne, Switzerland, have invented an Improvement in Stop-Watches, of which the following is a specification.

This invention relates to that class of stop watches in which the seconds hand is upon a central arbor, and an endwise motion is given to the arbor to connect the same with the rotating mechanism of the watch, and it is put out of gear by a similar movement in the opposite direction. In this class of watches an irregularity of movement arises from the action of the teeth as they are brought into gear in starting the hand. By the present improvement a very smooth and regular movement is obtained in connecting the independent seconds hand with the gearing.

In the accompanying drawings, Figure 1 is a plan on an enlarged scale of that portion of the stop watch mechanism to which the invention relates. Fig. 2 is a cross section with the parts in the position they assume when the seconds hand is at rest, and Fig. 3 is a similar view with the gearing connected. The parts in Figs. 2 and 3 are twice the dimensions of those in Fig. 1.

The wheel A is upon either axis of the ordinary watch works or mechanism and it is intended to give motion to the pinion B, the parts being so proportioned that the pinion B rotates once in a minute, and this pinion B is upon the arbor B′ that carries the independent seconds hand C. The arbor B′ carries the heart cam B^2 and also a wheel or disk B^3 provided with a tooth or projection b^3 to act upon the minutes-meter-wheel D; these parts however are of ordinary construction. The cam wheel F with the projection *f* is to be moved by a push button and receive a step by step motion as usual, and the spring E fixed at *e* to the watch plate is acted upon by the cam wheel F, and one end of this spring E is beneath the wheel B^3, and in the position of rest shown in Fig. 2, the end of the spring E has moved the wheel B^3 and its arbor so as to disengage the pinion B from the driving wheel A, the spring E resting upon one of the projections *f* of the cam wheel F. There is a spring G fixed to the bridge H and acting against the end of the arbor B′ to give motion to the same in the opposite direction to the movement received from the spring E, so that when the cam F is turned and the moving end of the spring E ceases to act upon the wheel B^3, the spring G gives to the arbor B′ and parts connected therewith an end movement to bring the pinion B into gear with the driving wheel A and cause the parts to assume the position shown in Fig. 3.

The peculiar feature of my invention relates to the construction of the parts which allows the pinion B to easily engage the wheel A. The pivotal end *b′* of the arbor B′ is within a slot *h* in the bridge H, and a spring J within a recess *h′* in said bridge presses the pivot *b′* in the direction of the wheel A. The contiguous edges of the teeth on the wheel A and pinion B are beveled or slightly conical, so that when the cam F is partially turned and the spring E draws away from the wheel B^3, the conical or beveled portions of the gear wheel and pinion come together by the action of the spring G, and the arbor B′ is slightly displaced laterally against the action of the spring J, the pivot *b′* moving in the slot *h* of the bridge H, thus insuring the proper engagement of the teeth of the wheel A and pinion B and preventing any false movement or looseness between such teeth, hence the seconds hand receives a smooth and regular movement. When the cam wheel F is again moved and one of its projections *f* acts upon the spring E, the wheel B^3 and the parts therewith connected return to the position shown in Fig. 2 and the movement of the seconds hand is stopped.

I claim as my invention.

In a stop watch the combination with the independent seconds hand and its arbor, of the pinion B and driving wheel A both provided with teeth and beveled or conical on their adjacent edges, the bridge having a slot for the pivot of the arbor, the spring J acting against such pivot, the spring G for giving an end movement in one direction to the arbor, and the cam and spring E for moving the parts in the other direction, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRI JACOT-BURMANN.

Witnesses:
E. IMER SCHNEIDER,
G. C. WEKLER.

(No Model.) 2 Sheets—Sheet 1.

J. P. TIRRELL.

ELECTRIC TIME ALARM.

No. 489,423. Patented Jan. 3, 1893.

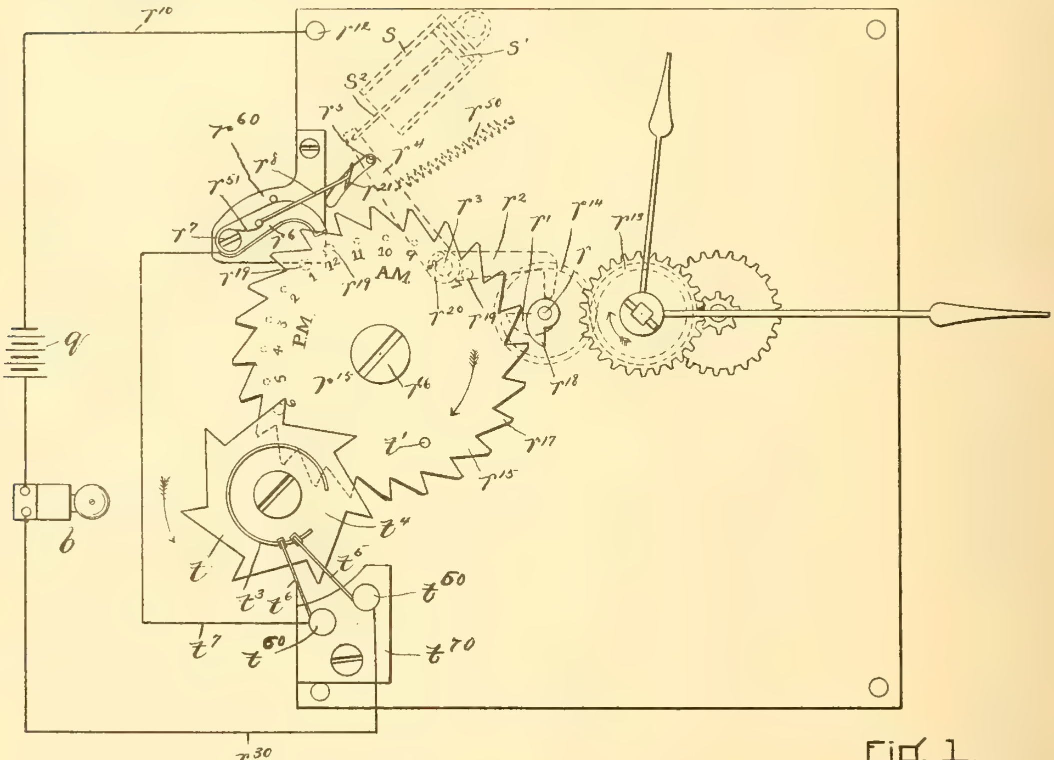


Fig. 1.

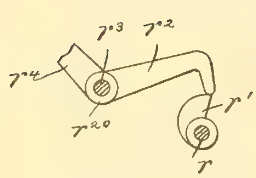


Fig. 3.

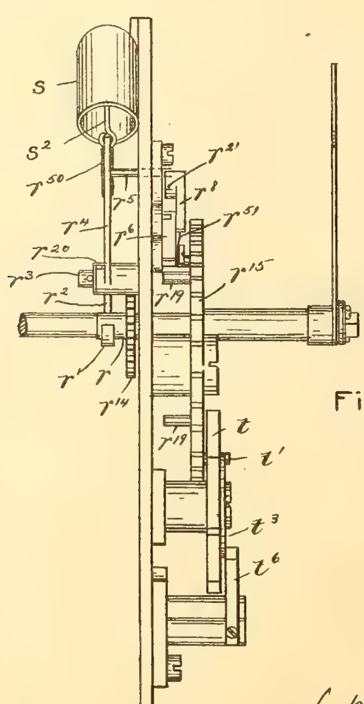


Fig. 2.

WITNESSES.

M. A. Jackson.
A. D. Harrison

INVENTOR.

J. P. Tirrell
by Wright Brown & Crossley
Attys.

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. P. TIRRELL.

ELECTRIC TIME ALARM.

No. 489,423. Patented Jan. 3, 1893.

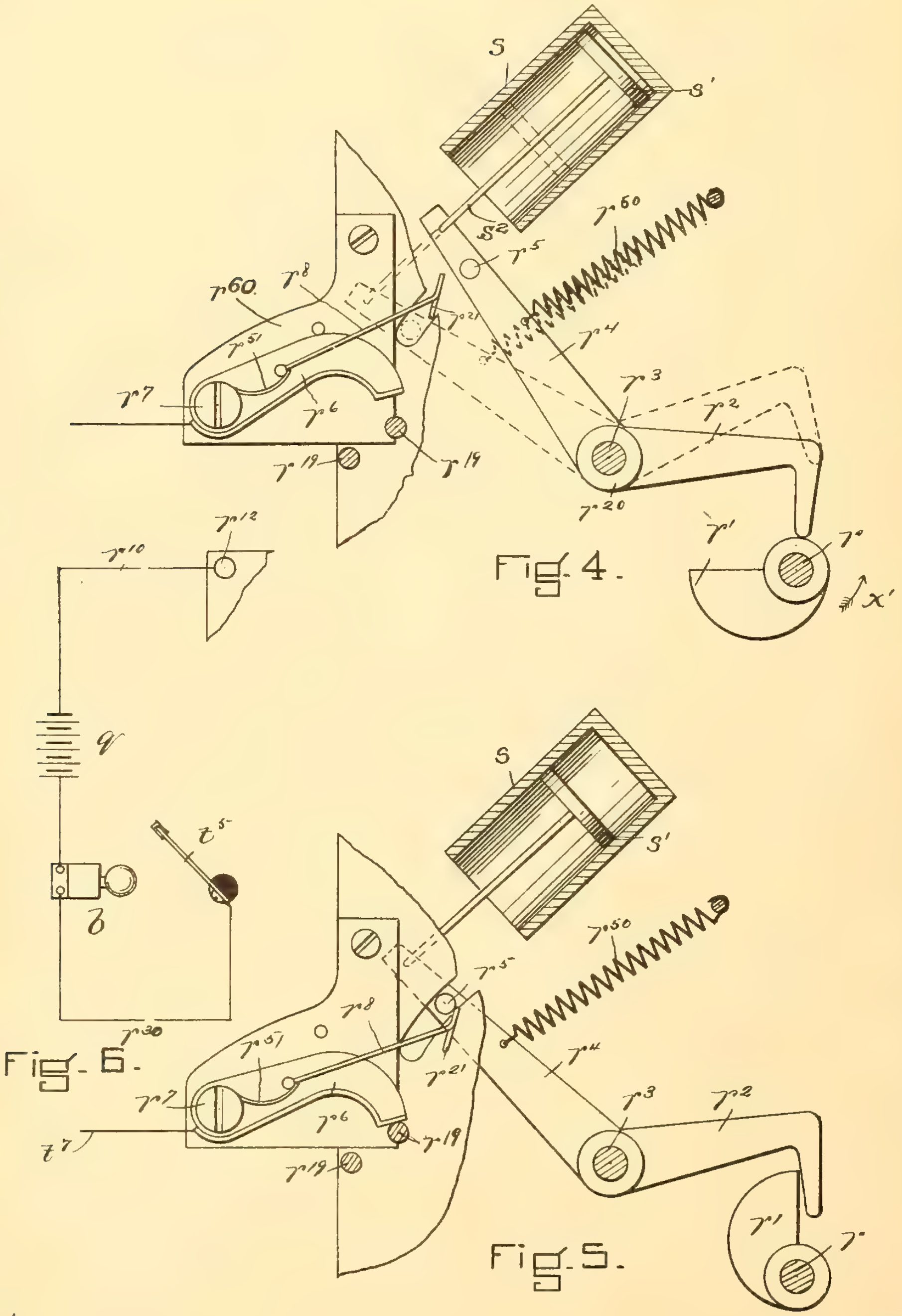


Fig. 4.

Fig. 5.

Fig. 6.

WITNESSES

M. W. Jackson

A. D. Harrison

INVENTOR

J. P. Tirrell

by Wright Brown & Crossley

Attys.

THE NORRIS PETERS CO. PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JACOB P. TIRRELL, OF BOSTON, ASSIGNOR TO HERBERT O. EDGERTON, OF GREENFIELD, MASSACHUSETTS.

ELECTRIC TIME-ALARM.

SPECIFICATION forming part of Letters Patent No. 489,423, dated January 3, 1893.

Application filed March 19, 1892. Serial No. 425,554. (No model.)

To all whom it may concern:

Be it known that I, JACOB P. TIRRELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Closing and Breaking an Electric Circuit at Predetermined Times, of which the following is a specification.

This invention has for its object to provide a simple and reliable mechanism for periodically closing and breaking an electric circuit for various purposes, such as the operation of an electric signal bell or the movement of an electrically controlled mechanical device.

The invention consists in the several improvements which I will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification, Figure 1 represents a front elevation of an apparatus embodying my invention. Fig. 2 represents an edge view of the same; and Fig. 3 represents a front view of a part of the mechanism shown in Fig. 1. Figs. 4 and 5 represent front elevations of parts of the apparatus on a larger scale, and Fig. 6 represents a diagram of the connections.

The same letters of reference indicate the same parts in all of the figures.

In carrying out my invention, I provide a time mechanism adapted to close an electric circuit at any predetermined period or periods of the day or night, for the purpose of giving a signal or permitting the operation of a mechanical device, such as a detent lever which may be controlled by the armature of an electro-magnet included in said circuit.

r represents a shaft, which is rotated at a predetermined rate by any suitable clock mechanism, said shaft being in this case rotated once each hour, in the direction indicated by the arrow x' (Fig. 4). The shaft r is provided with an arm r', which is caused by the rotation of the shaft r to displace a lever r^2, affixed to a hub or sleeve r^{20}, which is mounted on a fixed stud r^3 on the supporting frame. Said lever is moved by the action of the arm r' from the position shown in dotted lines in Fig. 1 and in full lines in Fig. 4 to that shown in full lines in Fig. 3 and in dotted lines in Fig. 4.

r^4 represents an arm rigidly attached to the sleeve r^{20}, and therefore movable with the arm r^2, said arm being provided at one end with a pin or stud r^5.

r^6 represents a contact arm or lever, which is pivoted at r^7 and carries an extension or spring r^8, arranged to co-operate, as hereinafter described, with the stud r^5. The arm r^6 is insulated from the metallic frame of the machine by an insulating plate r^{60}. To said frame is connected a wire r^{10} extending from binding post r^{12} to one pole of a battery q or other source of electricity.

r^{15} represents a wheel affixed to a stud r^{16} and provided with ratchet teeth r^{17} adapted to engage a tooth r^{18} affixed to the shaft r. Said shaft is rotated once each hour by a suitable clock train including the gears r^{13} r^{14}. There are twenty four ratchet teeth r^{17}, so that the wheel r^{15} is given a complete rotation once in twenty four hours. The wheel r^{15} is provided with any desired number of pins r^{19}, projecting from one of its sides, each pin being of a material which is a conductor of electricity and serving as an electrical contact piece to co-operate with the contact arm r^6, as presently described, in closing an electric circuit including the wire r^{10}, the metallic frame of the apparatus, the wheel r^{15} which is of conducting material, the arm r^6, a wire t^7 and a wire r^{30} insulated from the frame, as hereinafter described, and connected with the battery q, a wheel t, presently described, of conducting material in electrical contact with the frame, and contact springs connected with the wires r^{30} and t^7 and adapted to make contact with wheel t. The extension r^8 of the lever r^6 is provided with an offset or flange r^{21} (Figs. 1, and 5), which is arranged so that when the lever r^4 is moved by the spring r^{50} from the position shown in Fig. 3 and in dotted lines in Fig. 4, after the release of the arm r^2 by the arm or cam r', the stud r^5 on the arm r^4 will strike one side of said flange r^{21} and thus swing the contact arm r^6 in such manner as to throw its swinging end into the path in which the contact pins r^{19} of the wheel r^{15} move, as shown in Fig. 5, this operation occurring once in each hour. It will be seen, therefore, that if a pin r^{19} is in position to make contact with the arm r^6 when the latter

is swung inwardly, the circuit will be closed, the latter being thus caused to operate a signal bell b included in the circuit, or to operate any other electrically controlled device which may be provided.

There may be as many of the electrodes r^{19} as may be desired, and said electrodes may be arranged so that the circuit will be closed at any predetermined time or times of the day or night. As here shown, the wheel r^{15} is provided with orifices to receive twelve electrodes r^{19}, each orifice being preferably numbered to indicate the hour with which it corresponds, it being understood that each orifice will be in position to cause the contact of a pin held therein with the contact arm r^6 at the hour which said orifice represents. For example, an electrode r^{19}, inserted in the orifice marked 7 in the general division of the disk marked A. M., will be in position to close the circuit at seven o'clock a. m., a pin in the orifice marked 12 will close the circuit at noon, a pin in the orifice in the P. M. division marked 1 will be in position to close the circuit at one o'clock p. m., and a pin in the orifice in the P. M. division marked 6 will close the circuit at six o'clock p. m.

The circuit closing movement of the lever r^4 is preferably retarded so that the contact arm r^6 will be held for a considerable length of time in its circuit closing position, to obviate the liability of its return to its inoperative position before time has been afforded for contact with a pin r^{19}. To this end I provide a cylinder s, which is affixed to the supporting frame and has a piston s' provided with a rod s^2, the outer end of which is loosely connected with the lever r^4. The cylinder s is closed at one end and constitutes an air chamber containing an air cushion which retards the inward movement of the piston s'. After the stud r^5 has passed beyond the inner end of the flange or off-set r^{21} on the arm r^8, the contact arm r^6 is released and is moved by a spring r^{51} to the position shown in Figs. 2 and 5 the contact arm being thus withdrawn from the path in which the pins r^{19} move.

I prefer to employ a device for automatically making the above described mechanism inoperative at predetermined intervals, such as every seventh day. Said device includes a ratchet wheel t, having seven teeth, each corresponding to one day of the week. Said wheel is arranged to receive a partial rotation once in every twenty four hours, by means of a tooth or pin t' attached to the wheel r^{15}. To the ratchet t is affixed a segmental metallic rib t^3, having its periphery interrupted by a recess t^4 corresponding with the tooth of the ratchet which represents Sunday. t^5 represents a contact spring, which is in electrical connection with the wire r^{30}, and is arranged to bear upon the rib t^3, and t^6 represents a similar spring connected by wire t^7 with the arm r^6 and also arranged to bear on the rib t^3. The springs t^5 and t^6 are supported respectively by posts t^{50}, t^{60}, which are attached to and insulated from the supporting frame by an insulating plate t^{70}. So long as the spring t^5, t^6, are in contact with the rib t^3, the circuit is closed whenever the arm r^6 strikes a pin r^{19}, the circuit including the spring t^6, wire t^7, arm r^6, pin r^{19}, wheel r^{15}, the metallic frame of the machine, wire r^{10}, battery, wire r^{30}, spring t^5 and rib t^3; but when the recess t^4 reaches a position to coincide with one of said springs, the circuit is broken, so that the contact between the arm r^6 and pins r^{19} will produce no result. The recess t^4 may be of such length as to keep the apparatus inoperative from midnight on Saturday to midnight on Sunday, or for any other desired length of time.

I do not limit myself to the particular devices shown for rotating the wheel r^{15} and for moving the contact arm at predetermined times into the path of movement of the contact pins or pieces r^{19}, and may adopt any other suitable means for effecting these results.

The details of construction of other parts of the apparatus, such as the retarding device and the device for making the circuit inoperative at predetermined intervals, may be variously modified without departing from the spirit of my invention.

I claim:

1. A circuit closing and breaking apparatus, comprising a wheel provided with one or more contact pieces or pins, all arranged in a single row or series which is concentric with the axis of the wheel, all of said pins moving in a single path; means for rotating said wheel at a predetermined rate; a contact arm pivotally connected to a fixed support at a point removed from the axis of the wheel and having its contact surface normally out of the path of movement of said pins, said arm being adapted to be moved so as to carry said surface into said path; means for moving the contact arm at predetermined intervals; and electrical connections, constituting with said arm and wheel an electric circuit which is closed by contact of the arm with a contact piece on the wheel as set forth.

2. In a circuit-closing and breaking apparatus, the combination of a wheel, adapted to hold a series of contact pieces or pins; mechanism for rotating said wheel at a predetermined rate; a contact arm, adapted to be moved into the path of movement of said contact pins, and held normally out of said path, said arm having an extension provided with an incline or off-set; a lever, and mechanism for oscillating it at predetermined periods, said lever having a projection which, during one of the movements of the lever, engages said incline and thereby forces the contact arm into the path of the pins; as set forth.

3. In a circuit-closing and breaking apparatus, the combination of a wheel, adapted to hold a series of contact pieces or pins, and provided with ratchet teeth; a contact arm,

adapted to be moved into the path of movement of said pins, and held normally out of said path, said lever having an extension, provided with an incline or off-set; a lever adapted to be oscillated and provided with a projection adapted to engage said incline; and a time train, one arbor of which is provided with a tooth, adapted to rotate said wheel step by step, and with another tooth adapted to move said lever; as set forth.

4. In a circuit-closing and breaking apparatus, the combination of a wheel, provided with one or more contact pieces or pins; means for rotating said wheel at a predetermined rate; a contact arm, pivoted to a fixed support at a point removed from the axis of the wheel and having its contact surface normally out of the path of movement of said pins and adapted to be moved into said path; means for moving the contact surfaces into and out of said path at predetermined intervals; and a device to retard the inward movement of the contact arm; as set forth.

5. A circuit-closing and breaking apparatus, comprising a wheel, provided with one or more contact pieces or pins; means for rotating said wheel at a predetermined rate; a contact arm, which is normally out of the path of movement of said pins, and is adapted to be moved into said path; means for moving the contact arm into and out of said path at predetermined intervals; electrical connections, constituting with said arm and wheel an electric circuit, which is closed by contact of the arm with a contact piece on the wheel; and a device for making said circuit inoperative at predetermined times, said device comprising a segmental contact piece, such as t^3, adapted to be partly rotated by each complete rotation of said wheel, and having its continuity interrupted by a recess or opening, and contact springs co-operating with said contact piece, whereby the contact arm is thrown out of circuit when said recess reaches a given point; as set forth.

In testimony whereof I have have signed my name to this specification, in the presence of two subscribing witnesses, this 10th day of March, A. D. 1892.

JACOB P. TIRRELL.

Witnesses:
C. F. BROWN,
A. D. HARRISON.

(No Model.)

A. BIAGGI Y DIAS.

AUTOMATIC TIME LIGHTING DEVICE.

No. 489,428. Patented Jan. 3, 1893.

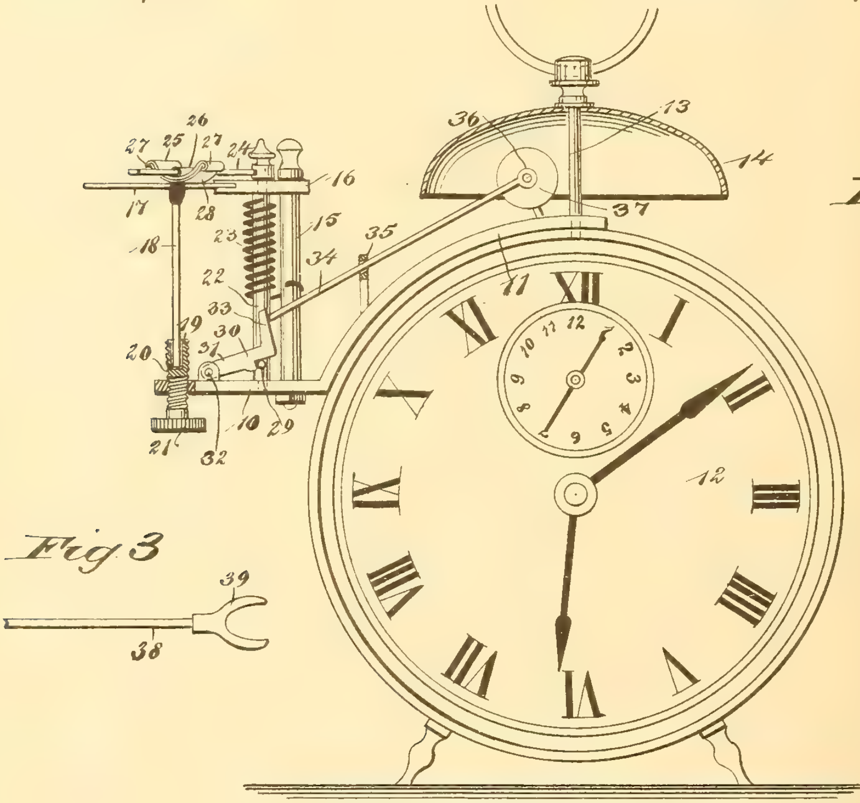


Fig. 1.

Fig. 3

Fig. 2.

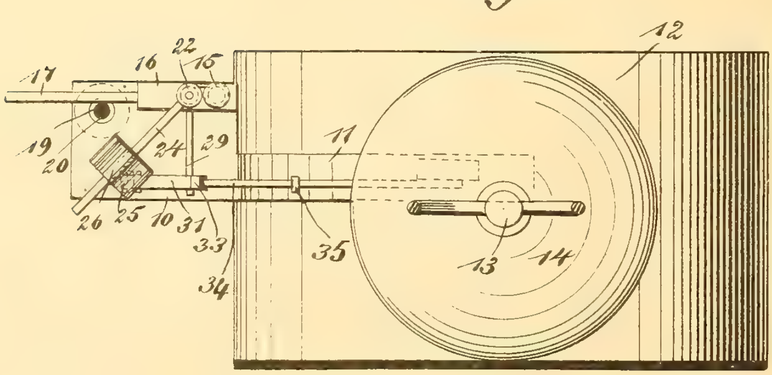
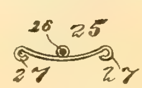


Fig. 4

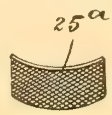


WITNESSES:

F. McArdle.

C. Sedgwick

Fig. 5



INVENTOR

A. Biaggi y Dias.

BY

Munn & Co

ATTORNEYS.

United States Patent Office.

ANTONIO BIAGGI Y DIAS, OF HAVANA, CUBA.

AUTOMATIC TIME LIGHTING DEVICE.

SPECIFICATION forming part of Letters Patent No. 489,428, dated January 3, 1893.

Application filed July 7, 1892. Serial No. 439,222. (No model.)

To all whom it may concern:

Be it known that I, ANTONIO BIAGGI Y DIAS, of Havana, Cuba, have invented a new and Improved Automatic Lighting Device, of which the following is a full, clear, and exact description.

My invention relates to improvements in automatic lighting devices, and the object of my invention is to produce a simple device which may be applied to any alarm clock, and which when the alarm goes off, will, by the movement of the hammer of the clock or its key, automatically strike a match so that if it is dark, the person wakened by the alarm may see to rise, or the match may be arranged so that a fire may be ignited if desired.

To this end, my invention consists in certain features of construction and combinations of parts, which will be hereinafter described and claimed.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar figures of reference indicate corresponding parts in all the views.

Figure 1 is a front elevation, partly in section, of the device embodying my invention, showing the same applied to a common alarm clock; Fig. 2 is a plan view of the same; Fig. 3 is a detail view of a modified form of trigger which may be used; Fig. 4 is a side elevation of the body of the striker; and Fig. 5 is a perspective bottom view of a modified form of striker.

The device is provided with a base plate 10, one end portion 11 of which is curved upward so as to fit the top of an alarm clock 12, but it will be understood that the plate may be secured to an alarm clock of any shape and of course the attaching portion of the plate will be shaped to fit the clock. The upper end of the curved portion or arm 11, is perforated so as to fit upon the standard 13 which supports the gong 14. The plate 10 carries a vertical stationary post 15, to the upper end of which is secured the outwardly-extending arm 16, which terminates in a reduced portion 17, adapted to form a support for the upper end or head of a match 18, so as to prevent the match from being broken by the striker, and the match is held in a vertical position, its lower end being retained in a socket 19, formed in the upper end of a screw holder 20, this screw being held to turn in a threaded portion of the base plate and having at its lower end a milled head 21, which enables it to be easily operated. By turning the screw up or down, it may be adjusted to a match of any length so that the head of the match will project slightly above the head of the arm 16.

A revoluble shaft 22 is journaled in the plate 10 and an arm 16, so as to extend parallel with the post 15, and this shaft is normally turned back, that is, to the left when looking upon the drawings in Fig. 1, by a spiral spring 23, which is coiled around the shaft and has one end secured to the shaft and the other to the post 15.

At the upper end of the shaft 22 is a laterally-extending striker arm 24, which carries the striker 25, this consisting of a curved plate having a convex lower portion, a sleeve 26 in the center and on the upper side to fit the arm, 24, although other means of fastening may be employed, and end hooks 27, formed by turning or bending under the ends of the striker. These hooks are adapted to retain a piece of sandpaper 28 (see Fig. 1) which when the arm is turned is thrown into contact with the head of the match 18, and ignites the same, but if desired, a metallic striker 25^a, shown in Fig. 5, may be used, this striker being simply a convex piece of metal with a roughened striking portion.

The shaft 22 has at its lower end a radially extending arm 29, which may be turned forward against the tension of the spring 23, into the position shown in Fig. 1, where it is adapted to be engaged and retained by a shoulder 30 on the latch or sear 31, which is pivoted at one end to the base plate, as shown at 32, and which has its free end bent upward, as shown at 33, so as to extend into the path of the trigger 34, which trigger is a straight rod held to slide in a keeper 35 secured to the curved portion 11 of the base plate, and the trigger has its upper end provided with an eye 36, which is secured to the hammer 37 of the alarm.

Instead of the form of trigger shown in Fig. 1, the trigger 38, shown in Fig. 3 may be used, this trigger having a fork 39 at its upper end instead of an eye, and the fork may be arranged so as to engage the hammer or the key of the alarm clock, but when the trigger 38 is

used, it is necessary to have two keepers 35 instead of one. It will be understood that this device may be secured to the back of the clock, so that the trigger may be operated by the alarm key as well as it is in its present position by the hammer of the alarm.

The operation of the device is as follows: To set it for use, the alarm is wound up as usual, the arm 29 is thrown forward into the position shown in Fig. 1, the latch or sear 31 drops into position to retain the arm 29 and lock the shaft 22, and this brings the arm 24 and striker 25 in front of the arm 16, as shown in Fig. 2. The match 18 is then inserted in the socket 19 of the match holder, and when the alarm goes off, the hammer 37 will advance toward one side of the gong 14, thus pushing upon the trigger 34, which lifts the sear 31 and releases the arm 29. The spring 23 then throws the shaft 22 quickly around and the shaft carries with it the striker 25, which passes across the head of the match, thus igniting the latter, and the striker passes on out of the way of the flame. The movement of the shaft is limited by the arm 29, which will bring up against the back side of the post 15.

Having thus described my invention, I claim as new, and desire to secure by Letters Patent,—

1. The combination with the base or plate provided with a vertical shaft having a horizontally extending striker or scratch arm, a spring for turning said shaft, a latch for holding the striker or scratch arm retracted, and means for releasing the latch from a clock mechanism, of a vertically extending match holder beneath the striker arm, and consisting in a screw extending up through a threaded aperture in the base and provided with a socket in its upper end to receive the match, substantially as set forth.

2. The combination with the match holder, of the spring pressed swinging striker or scratch arm provided with a transversely extending curved plate having its ends bent upon themselves to form parallel ways, and provided on its upper side with a transverse sleeve through which said striker or scratch arm passes and an abrading surface mounted in said ways, a latch for the said striker and means for releasing the latch from a clock mechanism, substantially as set forth.

3. In a lighting device, the combination with externally threaded match holder, extending through a threaded aperture in the frame or base and having a socket at its upper end, of a striker arm to swing thereacross, and means for retaining and releasing the striker arm, substantially as set forth.

4. The combination with the clock having a bell hammer 37, of the lighting attachment, comprising the attaching plate, the vertical post 15 having a stationary match steadying arm 17 at its upper end, the vertical shaft 22 having a spring 23, horizontal striker arm 24 carrying the striker 25, the arm 29 on the lower end of shaft 22, the vertically swinging latch 30 to engage said arm and hold the striker retracted and provided with a projection 33, a match holder beneath the striker arm, and the rod 35 connected with the bell hammer and bearing against the projection 33, substantially as set forth.

ANTO. BIAGGI Y DIAS.

Witnesses:

JOSEPH A. SPRINGER,

ERNESTO L. TOSCA.

(No Model.)

O. E. HAUSBURG.

WATCHMAN'S TIME DETECTOR.

No. 489,532. Patented Jan. 10, 1893.

Fig. 1.

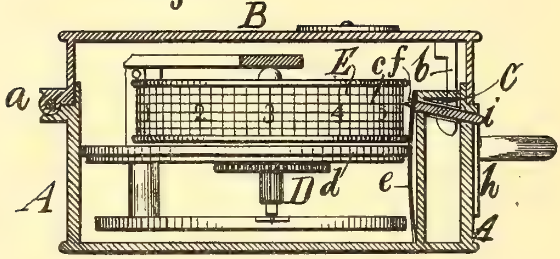
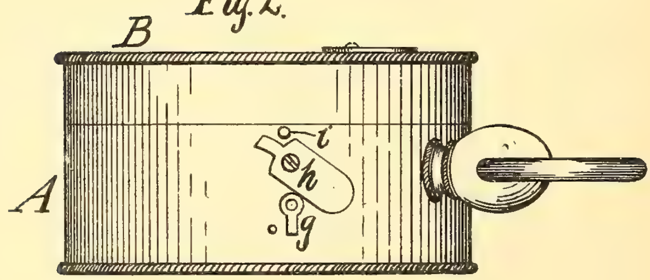


Fig. 2.



Witnesses:
G. F. Read.
Arthur C. Longyear.

Inventor:
Otto E. Hausburg,
by his attorney,
W. Bowen.

UNITED STATES PATENT OFFICE.

OTTO E. HAUSBURG, OF BROOKLYN, NEW YORK.

WATCHMAN'S TIME-DETECTOR.

SPECIFICATION forming part of Letters Patent No. 489,532, dated January 10, 1893.

Application filed March 10, 1891. Renewed April 12, 1892. Serial No. 428,782. (Model.)

To all whom it may concern:

Be it known that I, OTTO E. HAUSBURG, of Brooklyn, in Kings county and the State of New York, have invented a certain new and useful Improvement in Watchmen's Time-Detectors, of which the following is a specification.

I will describe the improvement in detail and then point out the novel features in claims.

In the accompanying drawings Figure 1 represents a sectional view of a watchman's clock embodying my improvement; and Fig. 2 is a view of the cover of the keyhole of the device for locking the cover of the clock to the case thereof.

Similar letters of reference designate corresponding parts in both figures.

A designates the case or shell of a watchman's time detector. It may be of any suitable construction. As shown it has a cover B hinged to it at *a*. This cover is secured by a lock C of any suitable character. In the one illustrated *b* designates a hasp fixed to the cover B.

Within the case is arranged a time movement. As this movement may be of any suitable character I have not deemed it necessary to show it entire, but have simply shown portions D of, such movement.

E designates a drum or carrier which receives rotary motion from the movement and which may rotate in unison with the hour hand. Around this drum or carrier and facing the same is a strip *c* of paper or other suitable material which can be readily perforated and which may be marked to designate any suitable periods of time. The drum or carrier may be grooved circumferentially under the paper strip so that the paper may be readily perforated.

The perforating or marking devices which are designed to be operated by the watchman by means of keys placed in the rooms or localities which he is expected to visit may be of any well known or suitable character, but as they form no part of my present invention it is unnecessary here to describe them.

To the plate *d* of the time movement I have shown secured a leaf spring *e*, carrying a perforating or marking device *f*.

g designates the hole in which it is intended to insert the key when it is desired to unlock the cover of the detector. Over this keyhole is placed a cover *h* which must be pushed aside when it is desired to insert a key in the keyhole.

i designates a pin, one end of which is shown as flattened and bears against the leaf spring *e*, while the other end tapers to a point and projects beyond the surface of the case. This pin *i* is so located with reference to the keyhole that said cover *h* cannot be so moved as to admit of the insertion of a key in the keyhole without pressing against the point of the pin *i* which projects beyond the case and thus causing this pin to press the spring *e* so that the marking device *f* on said spring will mark or perforate the strip *c* and thus record the fact that an attempt has been made to obtain access to the keyhole.

I do not limit myself to the use of the spring *e* and marking device *f*, for marking the strip *c*, as other suitable means for accomplishing this result will suggest themselves. For instance, I may form a shoulder on the pin *i* and arrange a spiral spring around said pin, and make the inner end of the pin pointed, so that when the cover *h* of the keyhole presses against the outer end of the pin the inner end of the pin will itself be caused to mark or perforate the strip *c*.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a watchman's time detector the combination of a cover, as *h*, for partly or wholly covering the locking mechanism of the detector, a pin as *i*, a spring in contact with said pin as *i*, a dial carried by the time movement of said watchman's time detector, said pin, as *i*, and said cover, as *h*, being in such positions with reference to each other that said cover cannot be moved to expose the locking mechanism without pressing said pin, as *i*, and thus causing the marking or perforating of said dial, substantially as specified.

2. In a watchman's time detector the combination of a drum or carrier revolved by

clock mechanism, a strip or piece of paper or other suitable material surrounding or facing the same, mechanism for locking the case of the detector, a cover for partly or wholly covering the locking mechanism of the detector, and a pin so arranged with reference to said cover that said cover cannot be moved to expose the locking mechanism without pressing said pin and thereby causing the marking of said strip of paper or other material, substantially as specified.

OTTO E. HAUSBURG.

Witnesses:
J. R. BOWEN,
R. R. HAVENS.

(No Model.) 2 Sheets—Sheet 1.

J. H. CARPENTER.

TIME STOCK FEEDER.

No. 489,789. Patented Jan. 10, 1893.

Fig 1

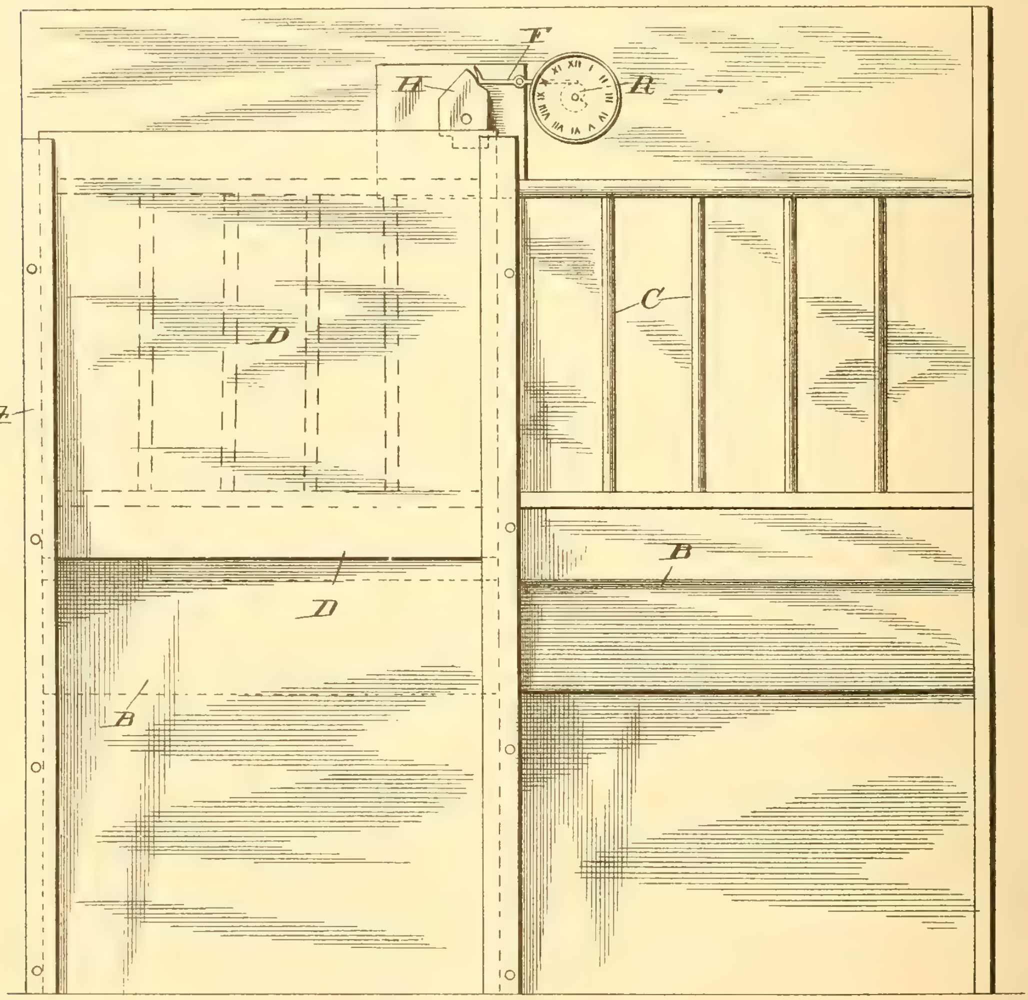
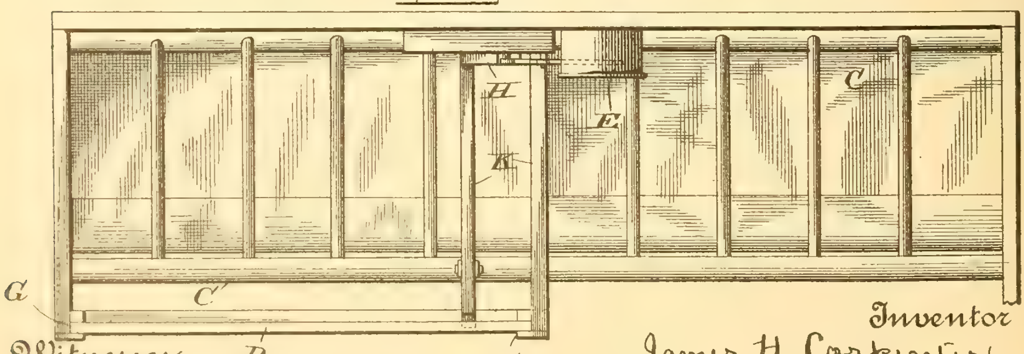


Fig 2



Witnesses

John Dawie

L. C. Hutt

Inventor

James H. Carpenter

by J. H. Gibbs

Attorney

(No Model.)

2 Sheets—Sheet 2.

J. H. CARPENTER.

TIME STOCK FEEDER.

No. 489,789.

Patented Jan. 10, 1893.

Fig 3

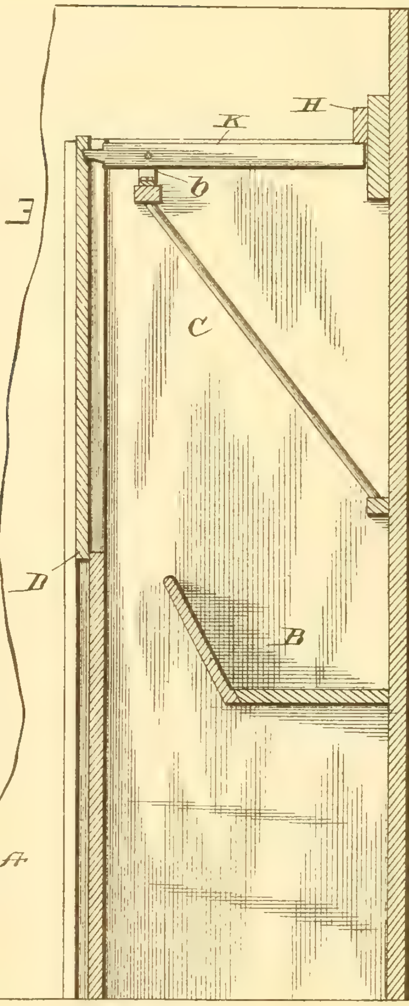


Fig 4

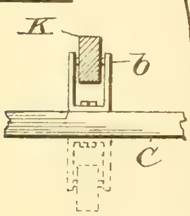
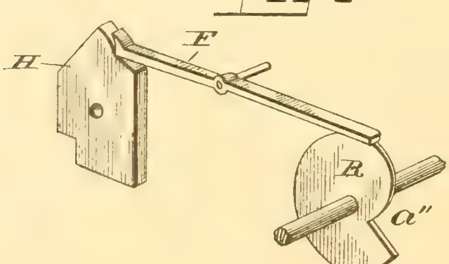


Fig 5



Witnesses

John [illegible]

L. C. Hutti

Inventor

James H. Carpenter

by J. H. Gibbs

Attorney

UNITED STATES PATENT OFFICE.

JAMES HOWARD CARPENTER, OF WEST POINT, GEORGIA, ASSIGNOR OF ONE-HALF TO THOS. T. EATON AND FRED D. HALE, OF LOUISVILLE, KENTUCKY.

TIME STOCK-FEEDER.

SPECIFICATION forming part of Letters Patent No. 489,789, dated January 10, 1893.

Application filed July 27, 1891. Serial No. 400,792. (No model.)

To all whom it may concern:

Be it known that I, JAMES HOWARD CARPENTER, of West Point, in the county of Troup, in the State of Georgia, have invented new and useful Improvements in Automatic Stock-Feeding Devices, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improvements in automatic stock-feeding devices and consists in certain new and useful devices and arrangements of parts whereby a simple, economical device is provided for the purpose intended, all as hereinafter more fully described and specifically set forth in the claim.

In the annexed drawings like letters of reference denote corresponding parts in all the views in which

Figure 1 is a face view or elevation of the feed end of an ordinary stall fitted with my improved device. Fig. 2, is a top plan view of the same. Fig. 3 is a longitudinal vertical section of the same. Fig. 4 is a detail view of the lever holding swivel hereinafter referred to, and Fig. 5 is a detail view of the disk —R— lever F, and eccentric stop H.

In the drawings —A— is the side-wall of a stall, —A′— is the inner end wall of the same.

—B— is the feed trough for grain &c.

—C— is the rack for holding the hay and similar food.

—D— is a shield or cover consisting merely of a door held in its elevated position, to cover one side of the divided rack and trough, by means of suitable devices hereinafter described, and —G—G— are ways or guides to hold the shield or gravity door in position.

Held in the yoke —*b*— is the lever —K— which engages at one end with the gravity shield —D— and is held at its opposite end by the eccentric stop —H— which is held in the position shown by the lever —F— which bears on said eccentric at one end and on an alarm disk of the clock —E— at the other end. This clock —E— is very similar to the ordinary striking alarm clock in its time setting feature, but has, necessarily, no alarm striking feature. In the center of the clock face is the ordinary alarm disk provided with numerals corresponding to the hours of the day and behind said alarm disk as a cam shaped disk —R— shown in Fig. 5 of the drawings which disk moves with the hours of the clock. Pivoted to the clock frame is the lever —F— which bears against the eccentric stop —H— at one end and sustains it in its upright position, while the other end of the lever —F— bears on the periphery of the disk —R— so that as said disk —R— is moving from left to right the lever —F— bears constantly thereon, though with slight pressure only.

Assuming the shield —D— to be in the position shown in the drawings it will be seen that the lever —K— sustains said shield in its elevated position, the eccentric stop securely holds the opposite end of the lever —K—, while said stop is in turn sustained in its vertical position by the lever —F— which is supported in its position as shown by the cam-shaped disk —R—, which is shown as nearing the time set for the alarm to work. When the disk —R— turns sufficiently to bring the cut away portion *a″* to a perpendicular the lever —F— will drop into the excision in the disk —R— thus releasing the eccentric stop —H—, which in turn releases the lever —K— and permits the shield —D— to drop by gravity to the floor, thus exposing the portion of the rack and feed trough which was previously protected by the shield —D—.

I have shown only one stall provided with my invention, though only one clock and alarm is needed to operate several such shields as are shown, and any expert mechanic will be able to so construct a series of drops so that, upon the release of the first shield, its weight may be utilized to cause the release of the next shield of the series which will be held in its elevated position by a spring catch or any ordinary and suitable device for that purpose, and as each of the series of shields drops, it will cause the release of the next shield of the series.

In Fig. 4 it will be observed that the lever —K— is held in a yoke secured to the cross-bar —*c*— running across the top of the rack —C—. The yoke is in full lines at the top

side of said cross bar and at the under side it is shown in dotted lines, as I do not wish to be limited to the location of said yoke.

Having described my invention, what I claim is:

In an automatic stock-feeding device, the combination of a hopper and feed-trough, a gravity door or shield normally closing the same, and sustained in an elevated position, a pivoted lever engaging with said shield at one end, a yoke —*b*— sustaining said lever at its fulcrum, a pivoted eccentric normally engaging the opposite end of said lever, a second pivoted lever bearing normally on said pivoted eccentric at one end, the disk —R— supporting the opposite end of said lever, an excision —a''— in said disk and suitable clock-mechanism for rotating said disk, and adapted to carry the excision therein to a perpendicular at predetermined times, all adapted, in combination, to release the gravity shield and expose the contents of the hopper substantially as and for the purpose specified.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Louisville, in the county of Jefferson, in the State of Kentucky, this 23d day of July, 1891.

JAMES HOWARD CARPENTER.

Witnesses:

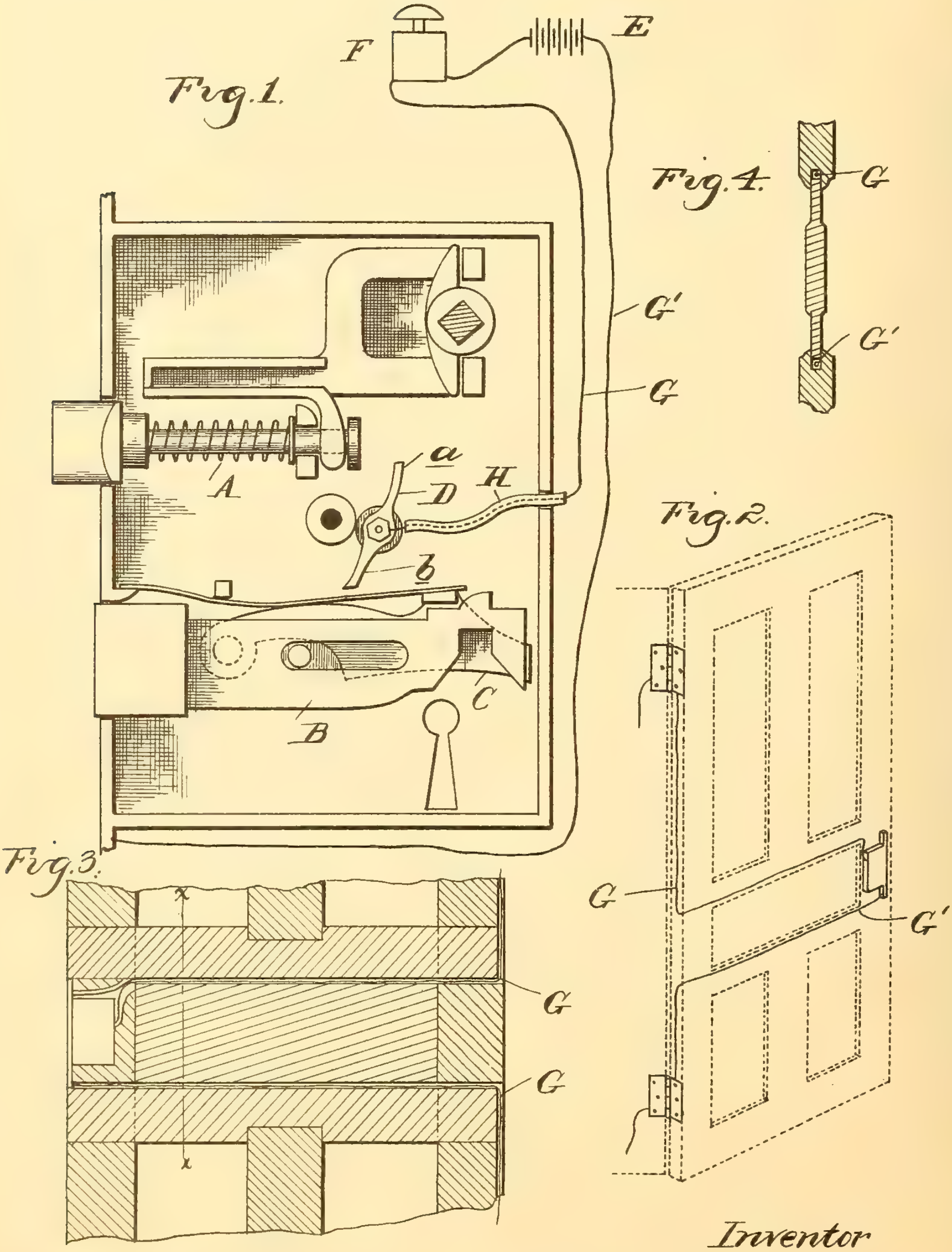
FRED R. LEVERING,
FREDERICK H. GIBBS.

(No Model.)

J. A. NADEAU.

ELECTRIC ALARM LOCK.

No. 490,161. Patented Jan. 17, 1893.



Witnesses
N. L. Lindop
W. B. O'Dogherty.

Inventor
Joseph A. Nadeau
By Thos. S. Sprague & Son Atty's.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH A. NADEAU, OF DETROIT, MICHIGAN.

ELECTRIC ALARM-LOCK.

SPECIFICATION forming part of Letters Patent No. 490,161, dated January 17, 1893.

Application filed September 2, 1892. Serial No. 444,913. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH A. NADEAU, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Electric Alarm-Locks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to new and useful improvements in electric alarm locks, and the invention consists in the peculiar arrangement of the circuit closing contacts all as more fully hereinafter described and shown.

In the drawings, Figure 1 is an elevation of a lock of known construction, to which my invention is applied. Fig. 2 is a perspective view of a door to which my invention is applied. Fig. 3 is a vertical central longitudinal section through the center panel of the door. Fig. 4 is a cross section on line $x—x$ Fig. 3.

A represents the latch bolt and B the bolt of the lock, the latter being controlled by the tumbler C operated in the usual manner by the key.

My invention consists in the arrangement of the metallic contact D, which is secured within the casing of the lock, suitable insulating material being used to insulate said contact D from all metallic connection with the lock. This contact D has two horns a and b, the former of which projects into the path of the latch A, in such a manner that when the latch is thrown back the rear end of the latch will come in metallic contact therewith. The other horn b projects in proximity to the tumbler C in such a manner that when the lock is lifted up by the operation of the key in the act of unlocking the door it will come in contact with said horn b.

E is a battery.

F is the electric alarm in circuit with the battery, and G G′ are the circuit wires of the battery. One of these circuit wires G passes through an aperture in the casing of the lock into the interior of the lock and has its free end secured in any suitable manner to the contact D, and that portion of the wire inclosed within the lock and to a certain distance thereof is covered with an insulating material H, whereby it is protected from all possible metallic contact with any portion of the lock except the contact D, the other wire G′ is connected to the casing of the lock.

In practice, my invention is designed to ring an alarm by the closing of a circuit in the act of operating the door lock, either by throwing the latch, or by applying the key. In the former instance it will be seen that the circuit is closed as soon as the rear end of the latch touches the horn a of the contact, while in the latter case the lifting of the tumbler closes the circuit as soon as it touches the horn b of the contact.

In the application of my invention I contemplate having the wires leading to the lock entirely concealed, and to this end, I bore with a fine gimlet suitable channels transversely through the body of the door, or utilize the mortise of the adjacent panel to string the wire through said mortise, which generally affords sufficient room for concealing such wires, as all doors in time shrink sufficient for the purpose. From the rear side of the door I then lead these circuit wires through the movable part of the door hinges. The circuit wires G G′ then extend farther from the stationary part of the door and hinges to the place where the battery and alarm are disposed, which in general will be the bedroom of the occupant of the house. I also preferably provide a switch at any suitable place in the circuit.

I am aware that electric alarms have been applied to the doors for closing the circuit by the throwing of the latch or bolt, but I am not aware that a fixed contact has ever been arranged in such a way as to be at once in the path of both, and I consider it also new to have that contact in such relation that it will close a circuit by the operation of the tumbler instead of the bolt. This saves the use of a switch to prevent the constant ringing of the alarm bell when the bolt is thrown back, and therefore the switch in my construction may be omitted without any inconvenience.

A further advantage of my construction is the manner of concealing the wires whereby the presence of the device is entirely concealed from everybody and increases the value of the device.

What I claim as my invention is:

1. The combination with a lock adapted to

be mounted upon a door and comprising a metallic case, a latch and a bolt controlled by a tumbler, of a battery, and electric signal circuit wires including said battery and signal, a contact piece upon the interior of said casing insulated therefrom and having two horns, one of which is adapted to contact with the latch and the other adapted to contact with the tumbler of the lock when the door is opened and circuit wires having one terminal secured to said contact and the other to the case of the lock, substantially as described.

2. In a burglar alarm, the combination with a door lock provided with a latch and a bolt controlled by a tumbler and a battery, an electric signal, a contact piece within the casing of the lock and povided with two horns with which the latch and tumbler of the bolt are adapted to contact respectively upon the operation of said latch and bolt, circuit wires closing the battery and electric signal, and respectively connected to the contact piece in the lock and to the casing of the lock, said circuit wires being concealed within the door and electrically connected through the hinges of the door, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOSEPH A. NADEAU.

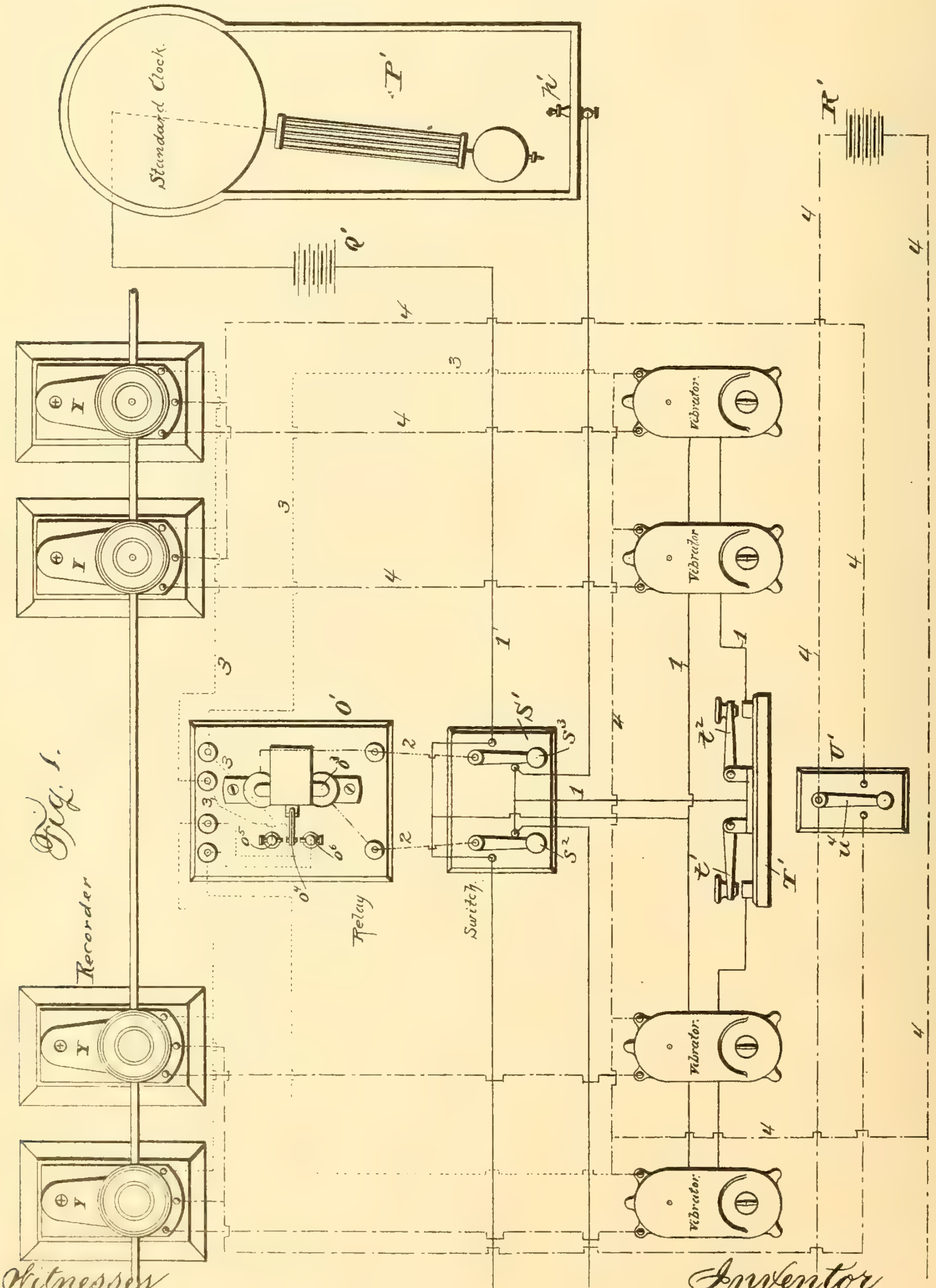
Witnesses:
M. B. O'DOGHERTY,
N. L. LINDOP.

(No Model.) 17 Sheets—Sheet 1.

G. E. HUNTER.

MECHANISM FOR TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 490,202. Patented Jan. 17, 1893.



Witnesses
Chas. J. Williamson
Henry C. Hazard

Inventor
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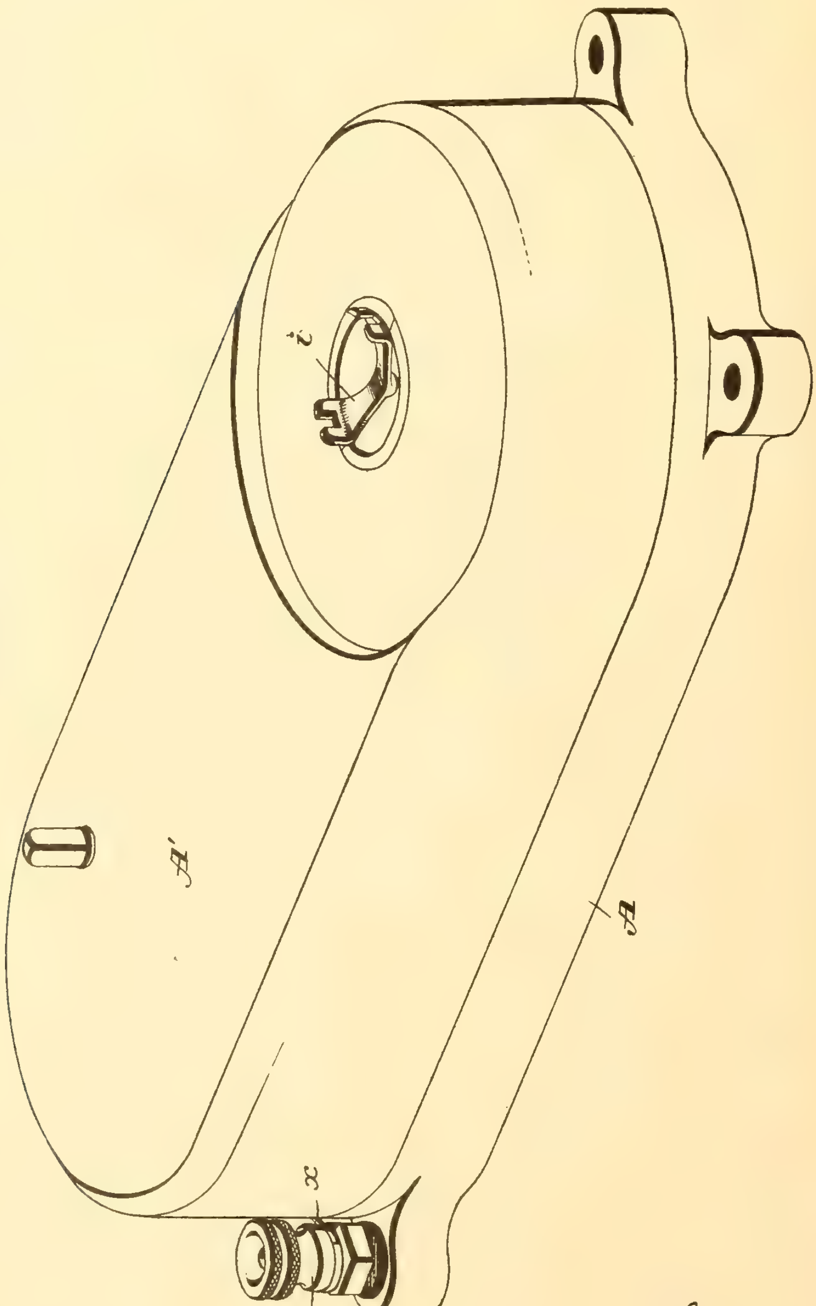
(No Model.) 17 Sheets—Sheet 2.

G. E. HUNTER.

MECHANISM FOR TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 490,202. Patented Jan. 17, 1893.

Fig. 2.



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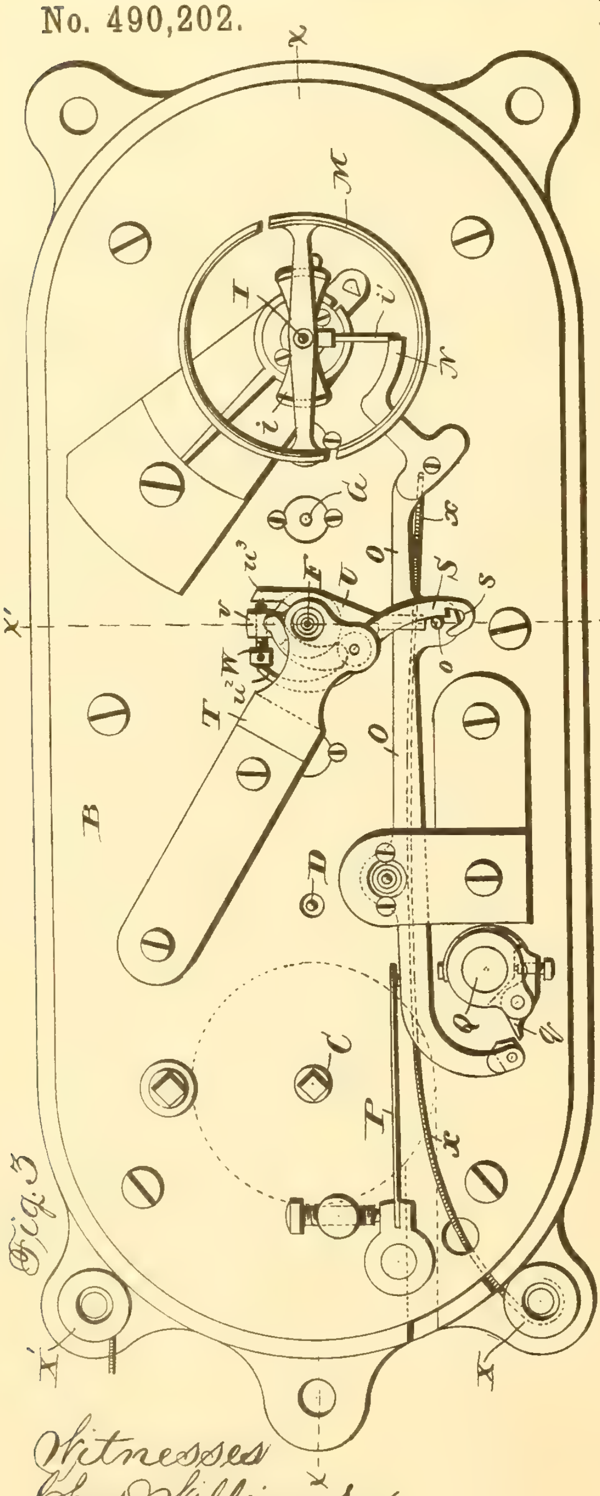

Fig. 3

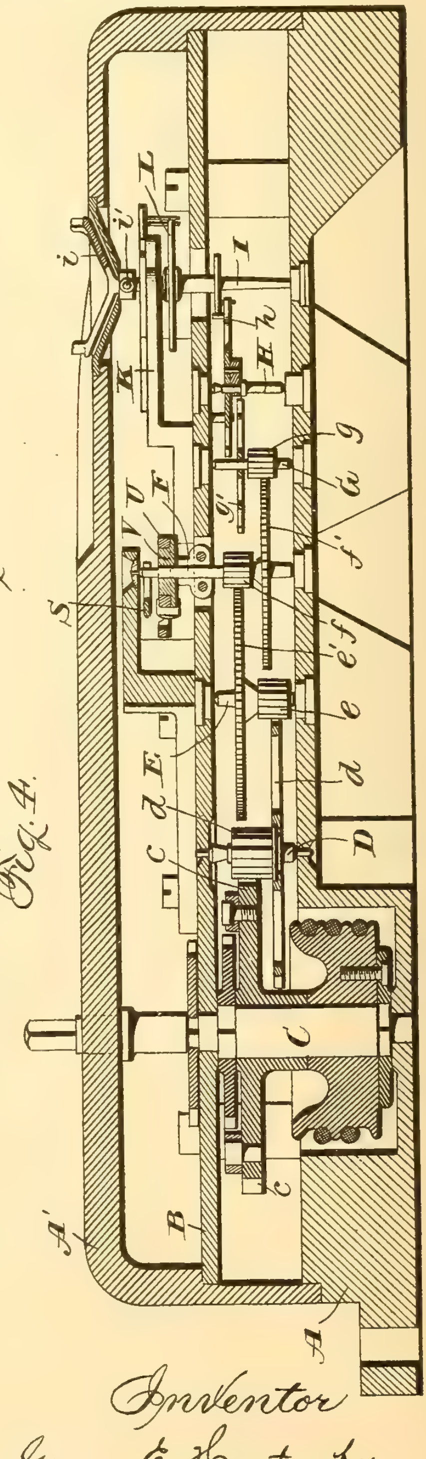

Fig. 4

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(No Model.) 17 Sheets—Sheet 4.

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Fig. 5.

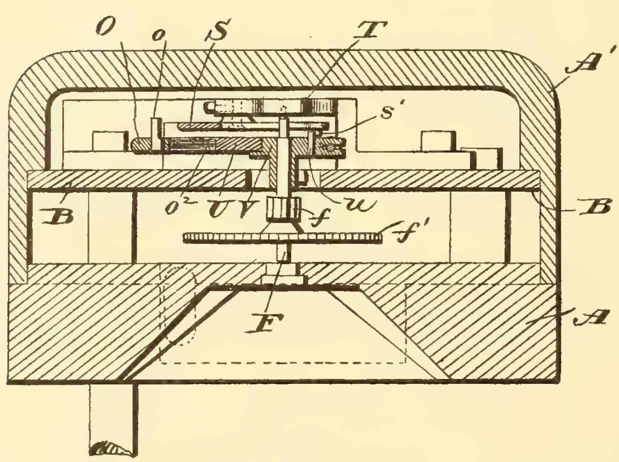

Fig. 6.

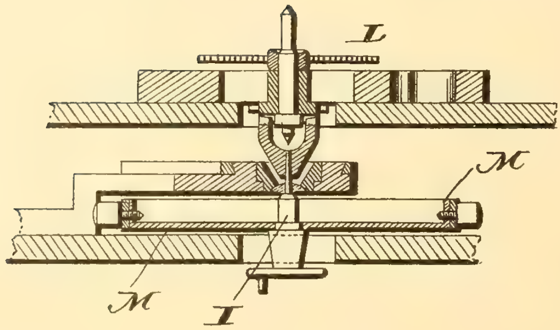

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Fig. 7.

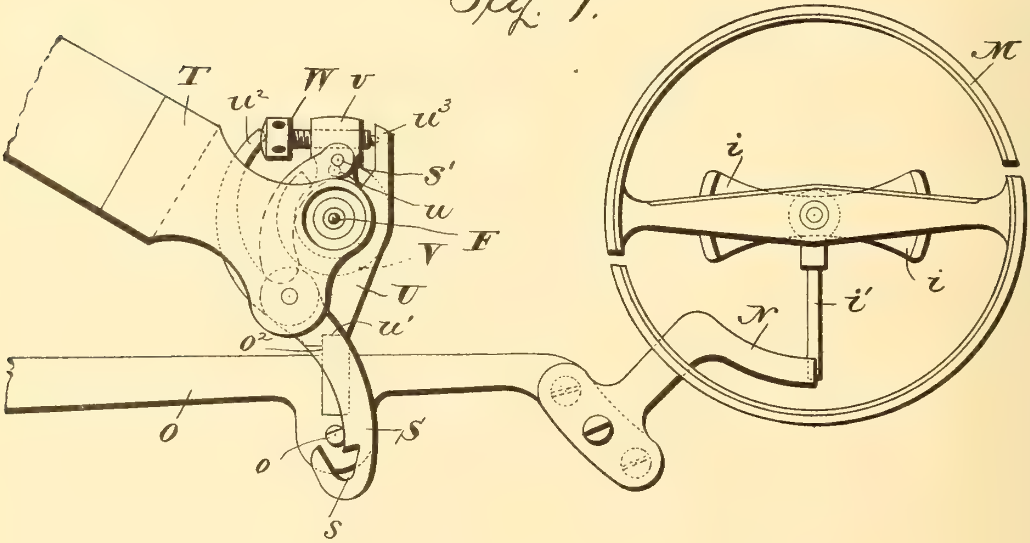

Fig. 8

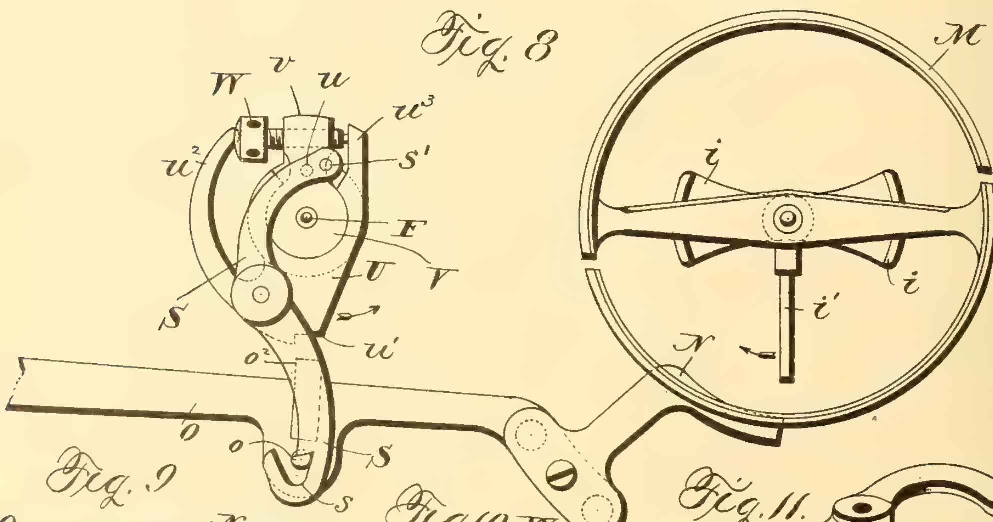

Fig. 9

Fig. 10

Fig. 11.

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Fig. 12.

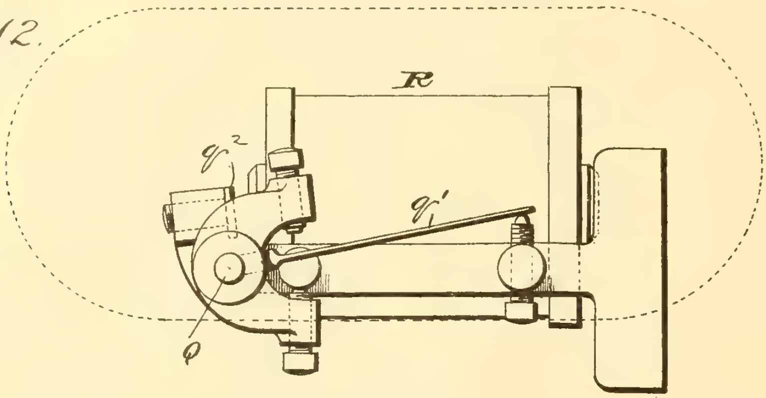
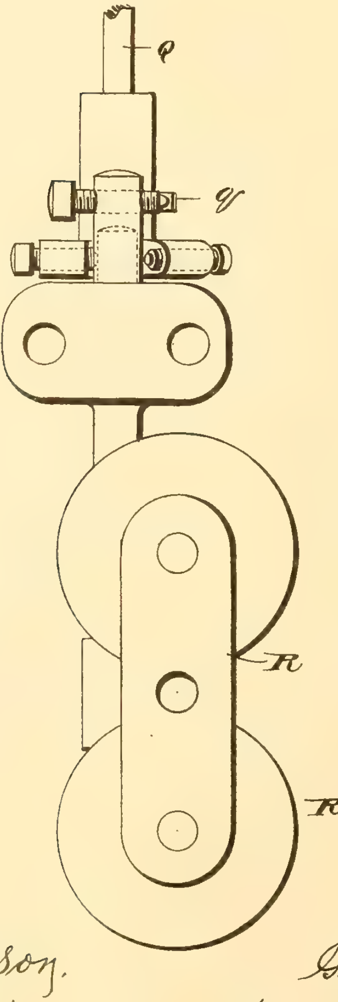


Fig. 13.



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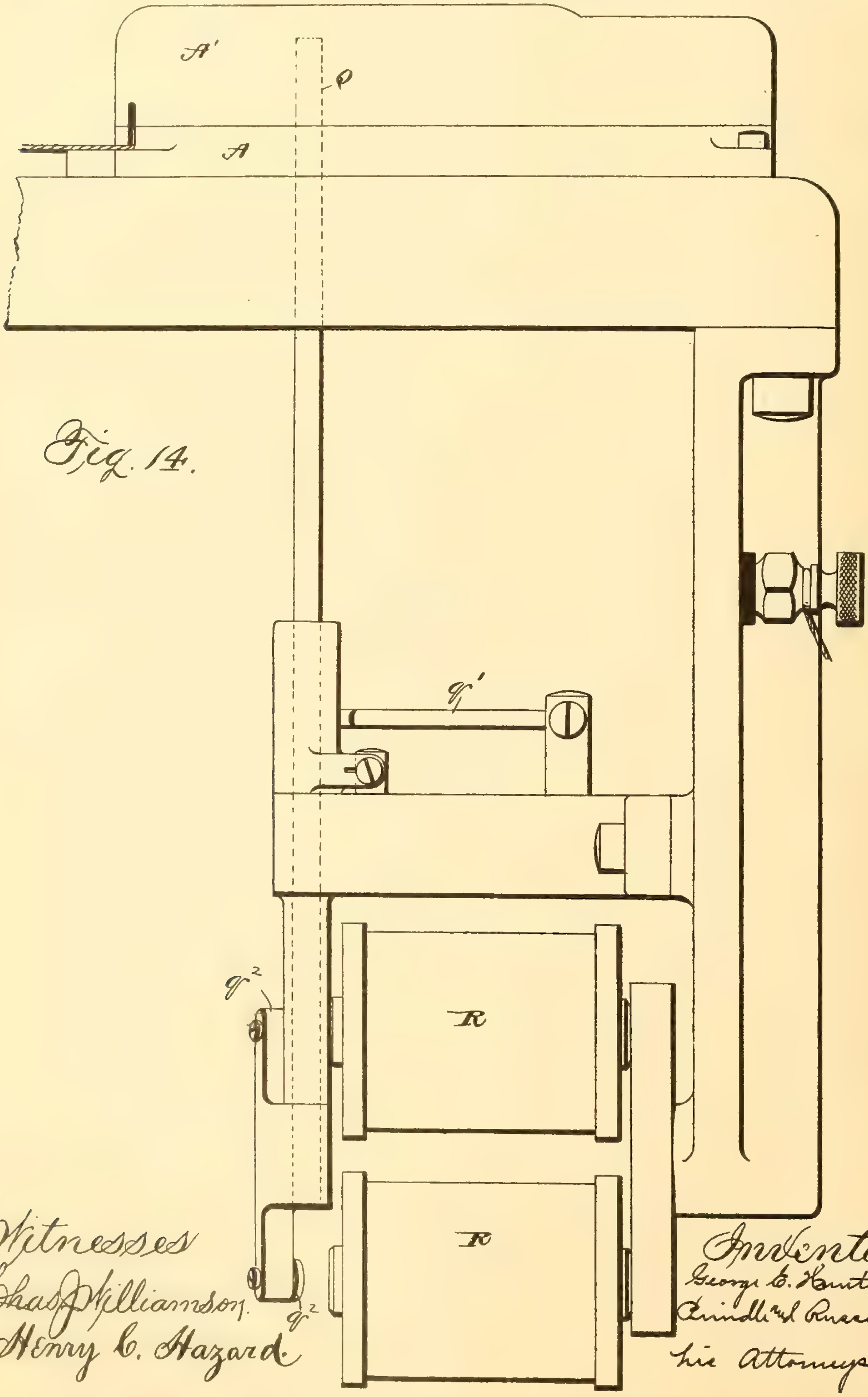

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Fig. 15.

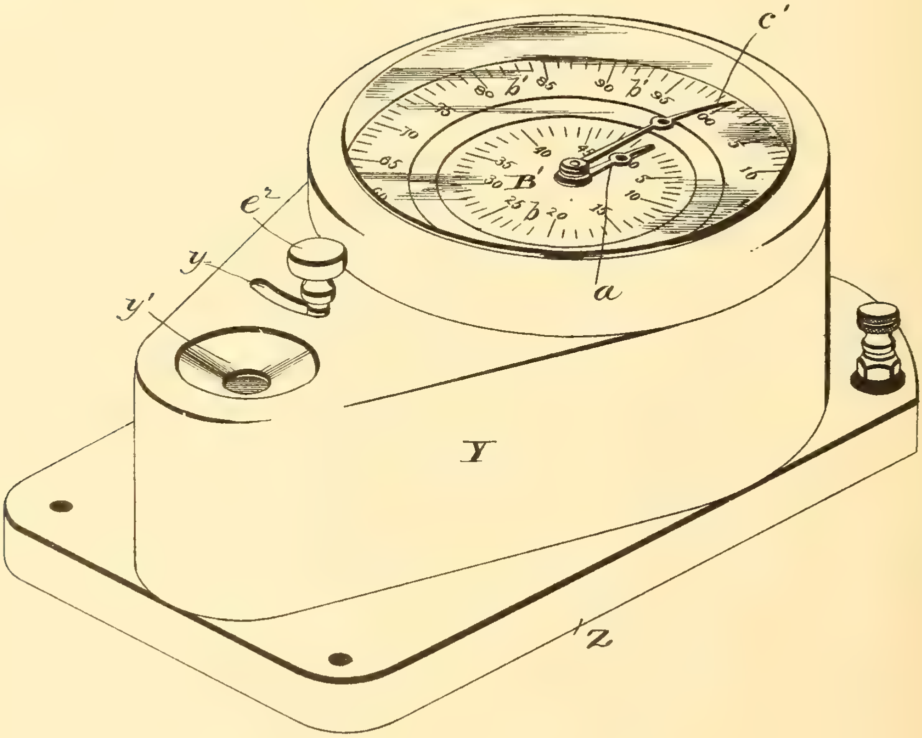

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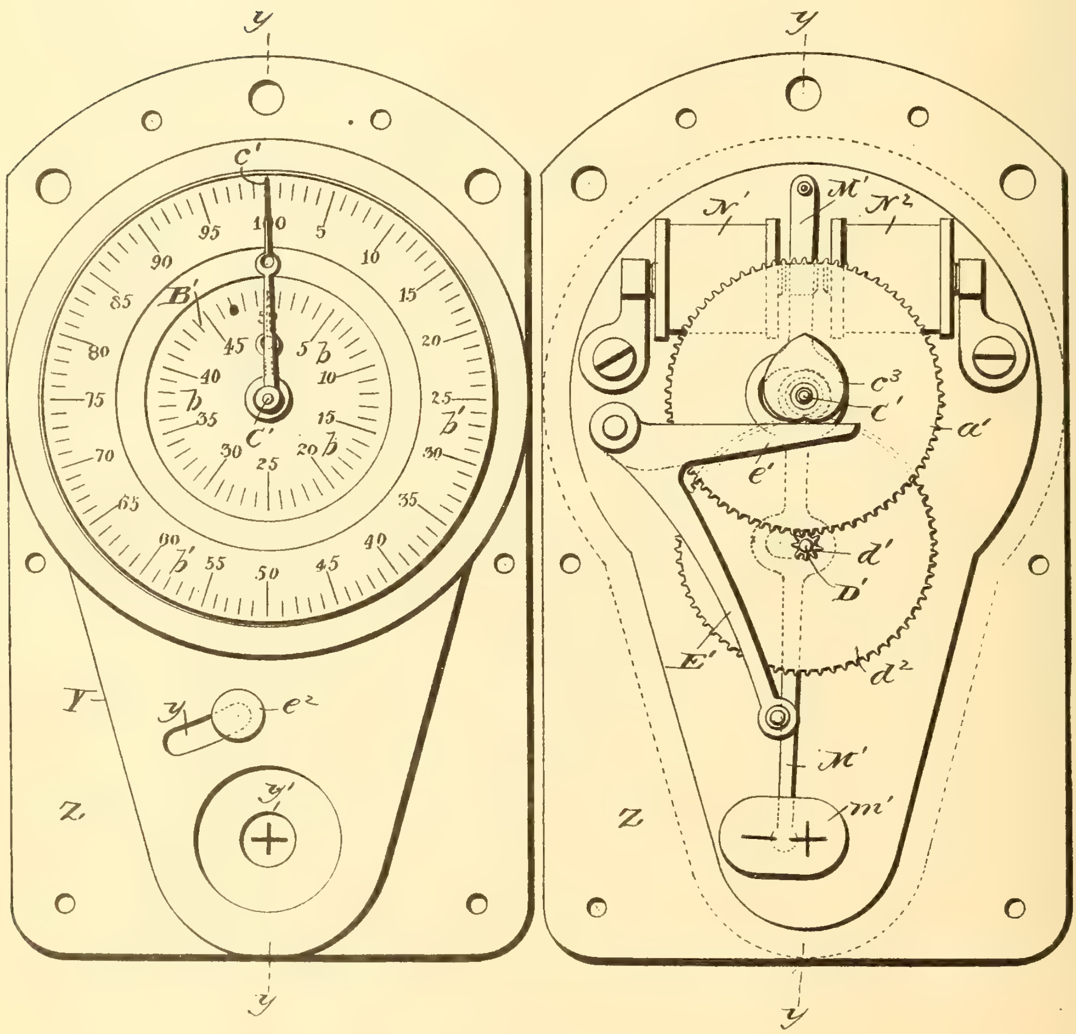
Fig. 16. Fig. 17.



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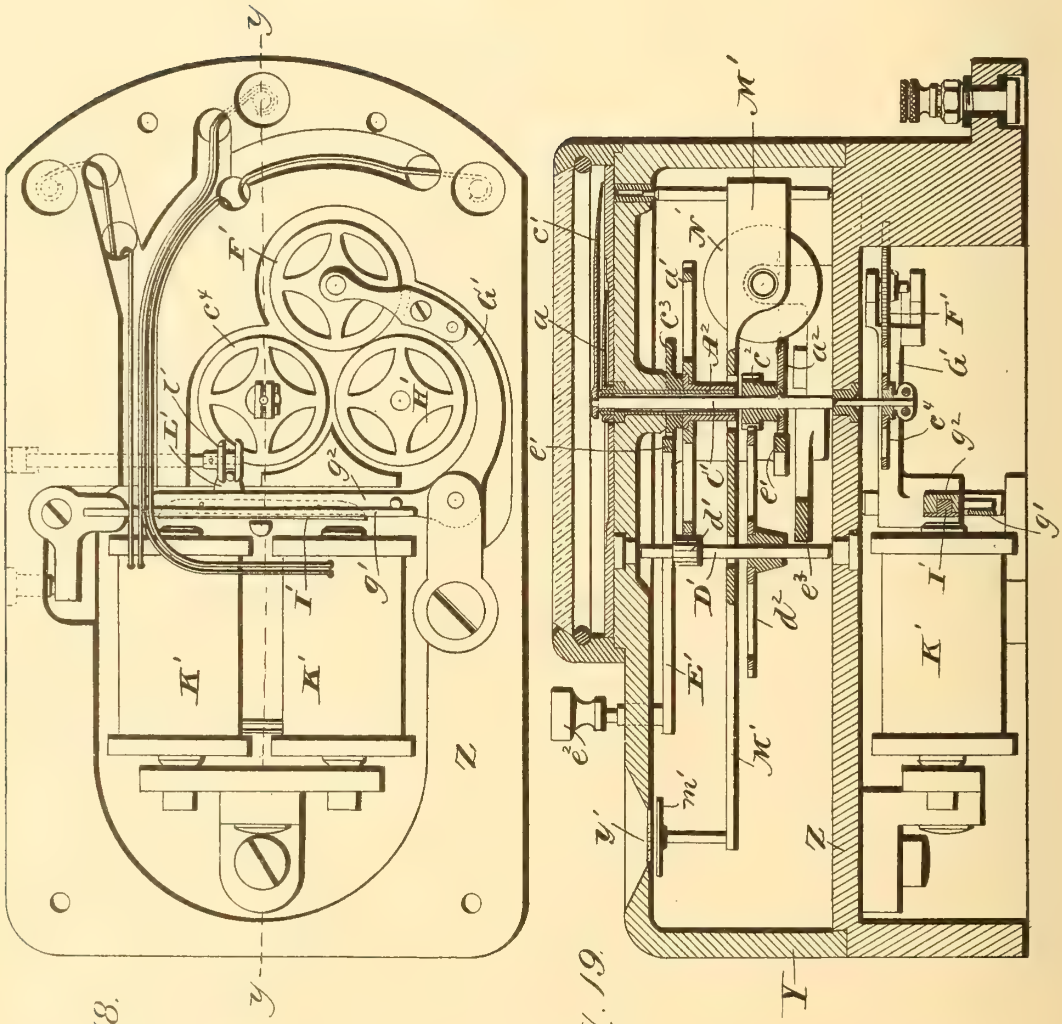

Fig. 18. Fig. 19.

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Fig. 20

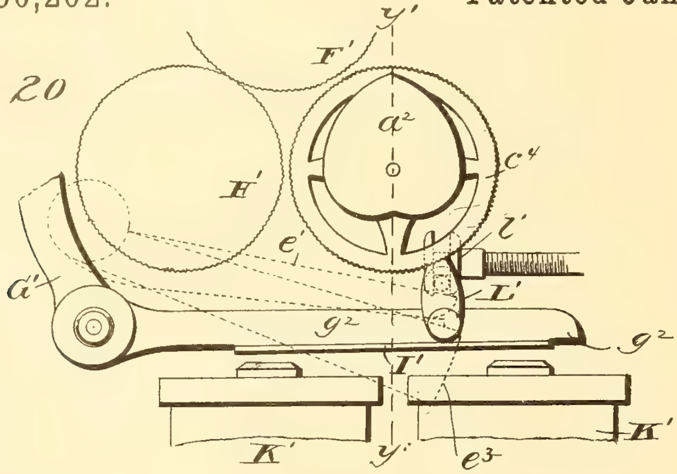

Fig. 21.

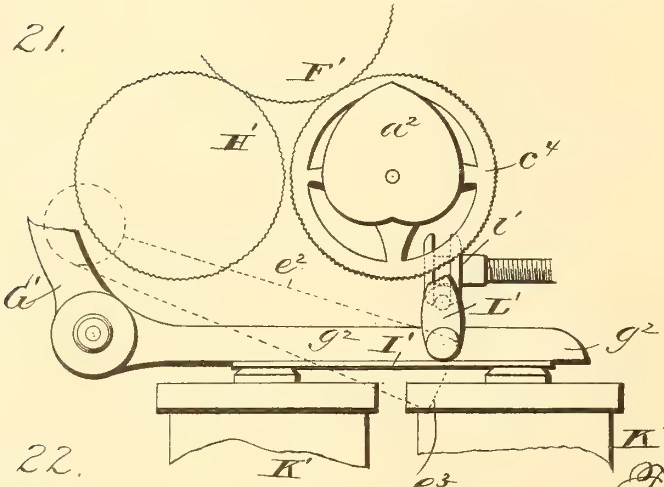

Fig. 22.

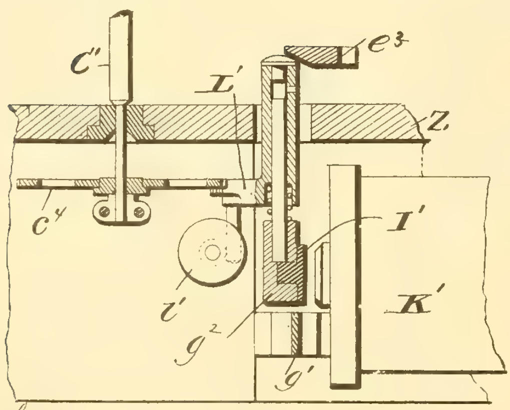

Fig. 23.

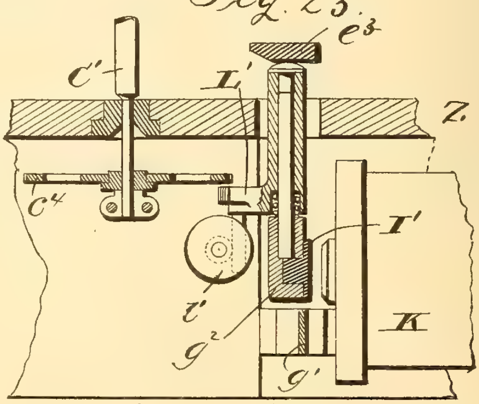

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Fig. 24.

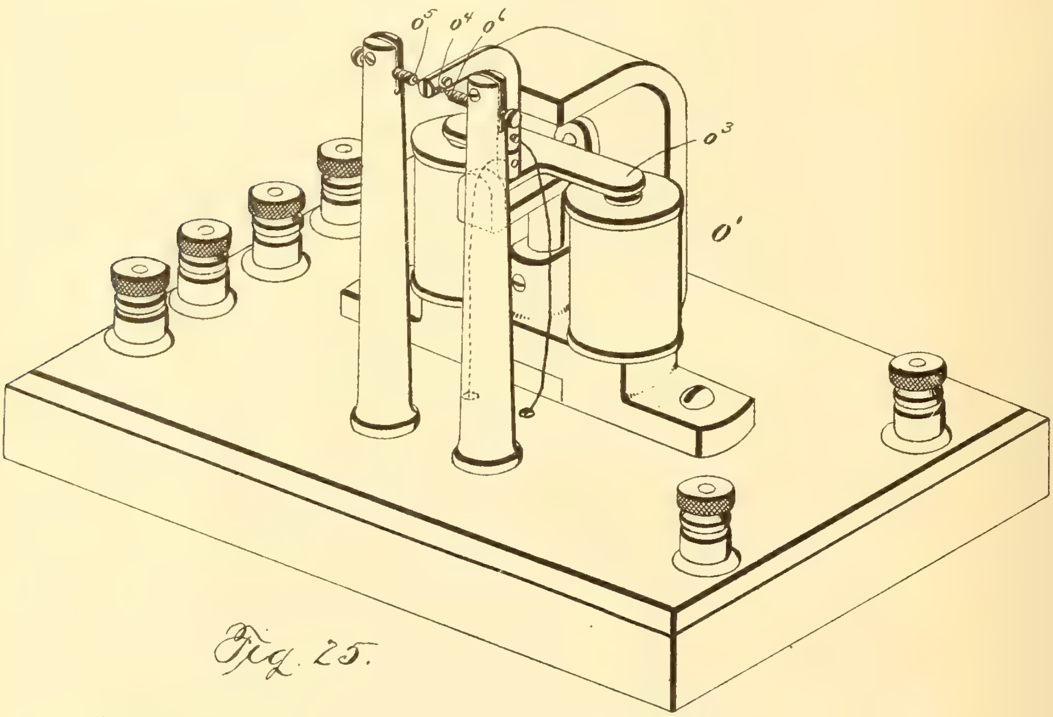

Fig. 25.

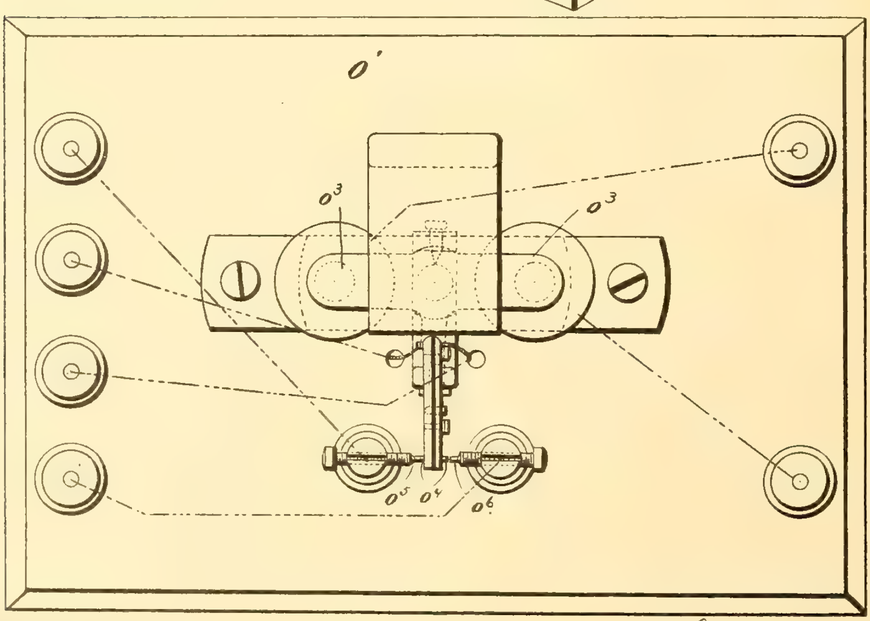

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Fig. 26.

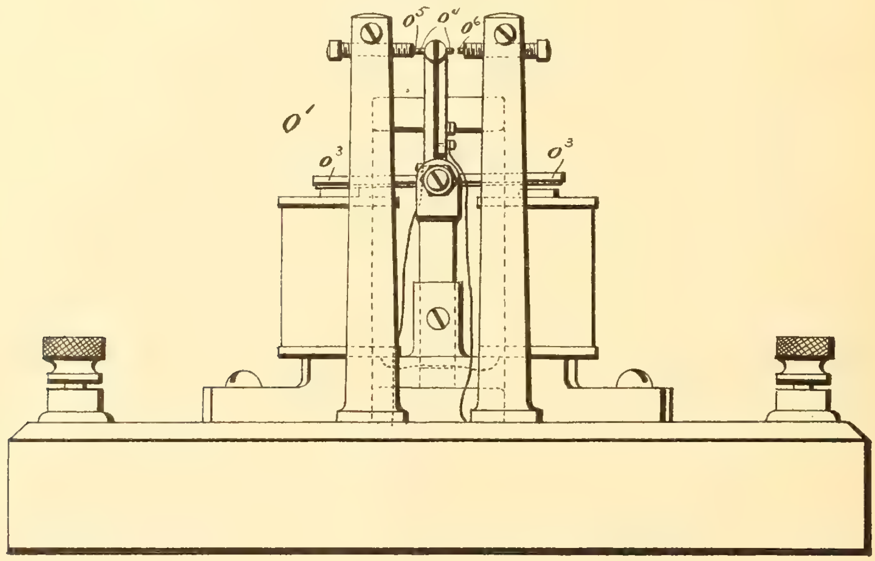
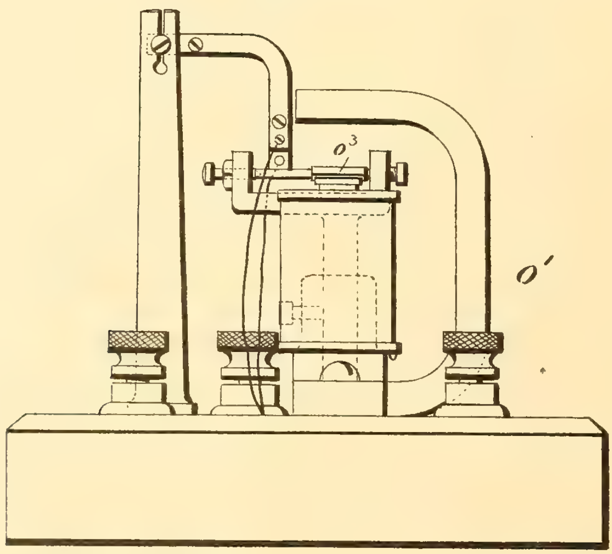


Fig. 27.



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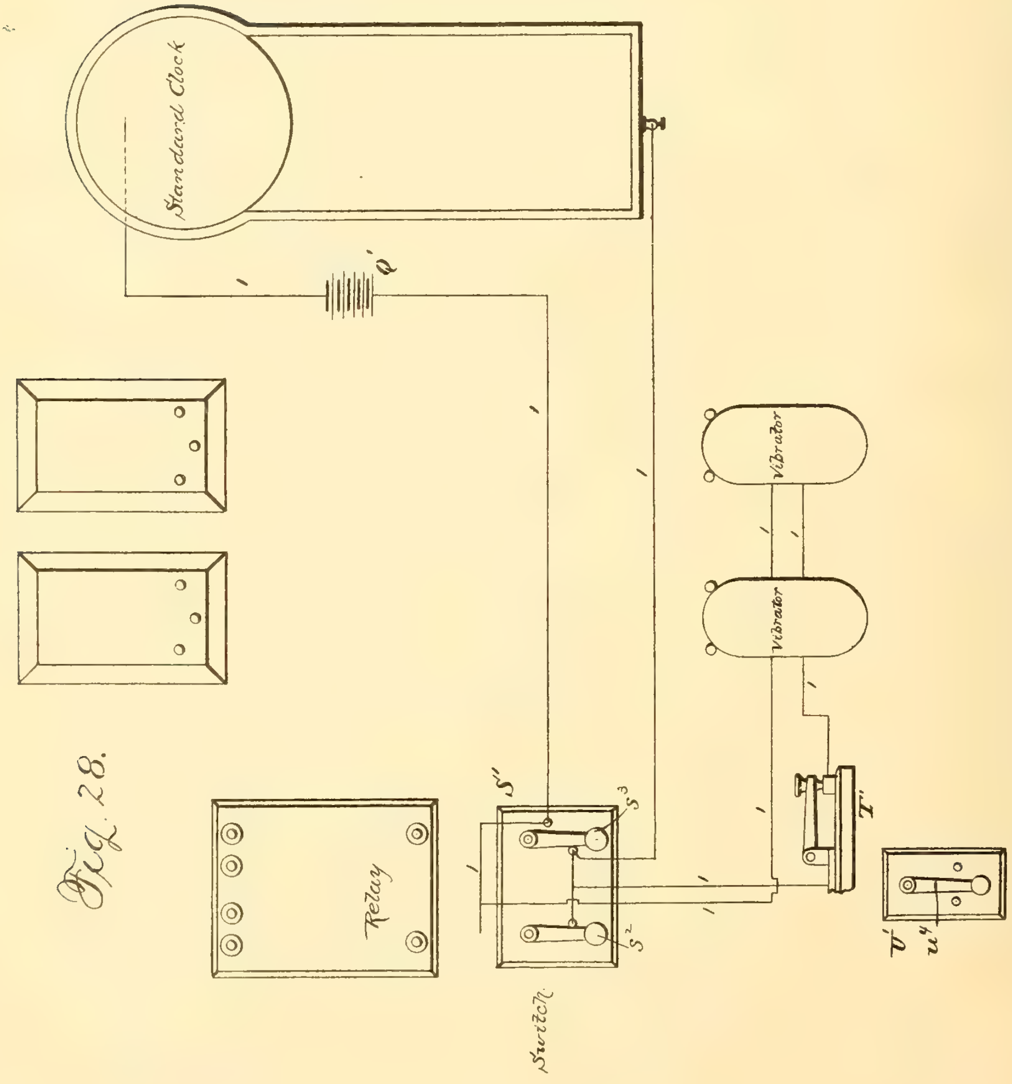

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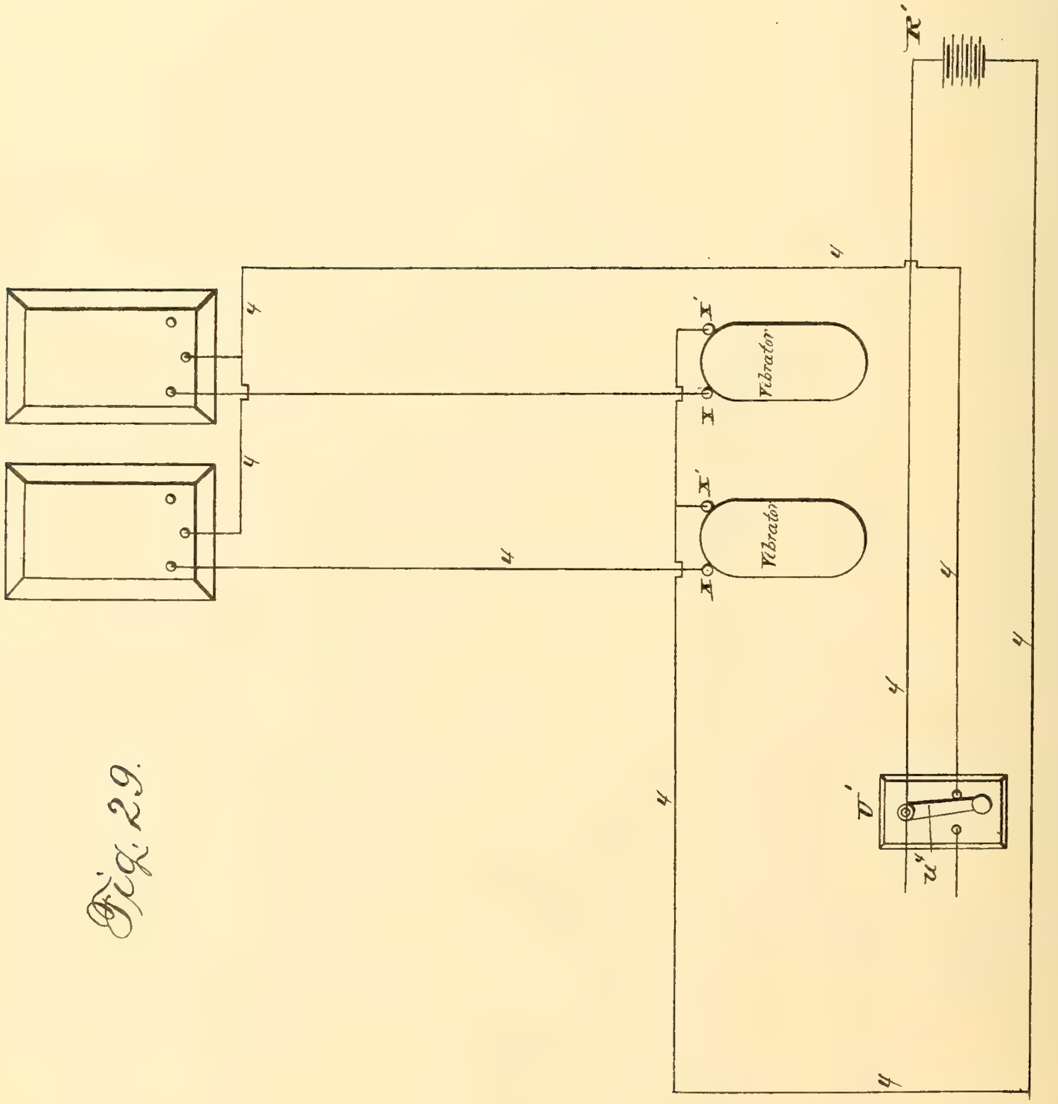

Fig. 29.

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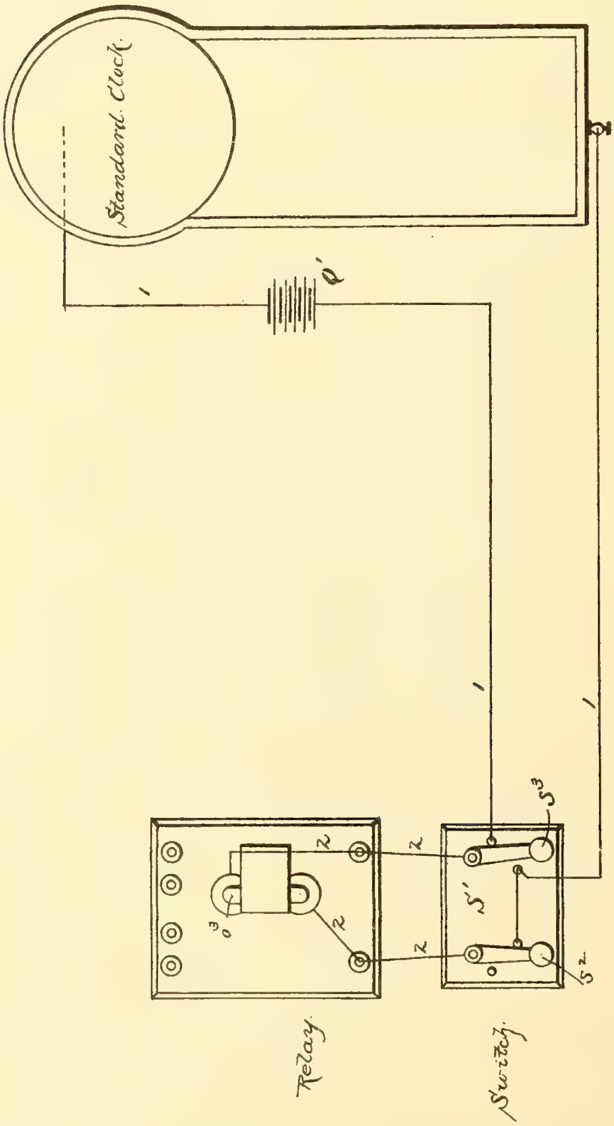
Fig. 30.



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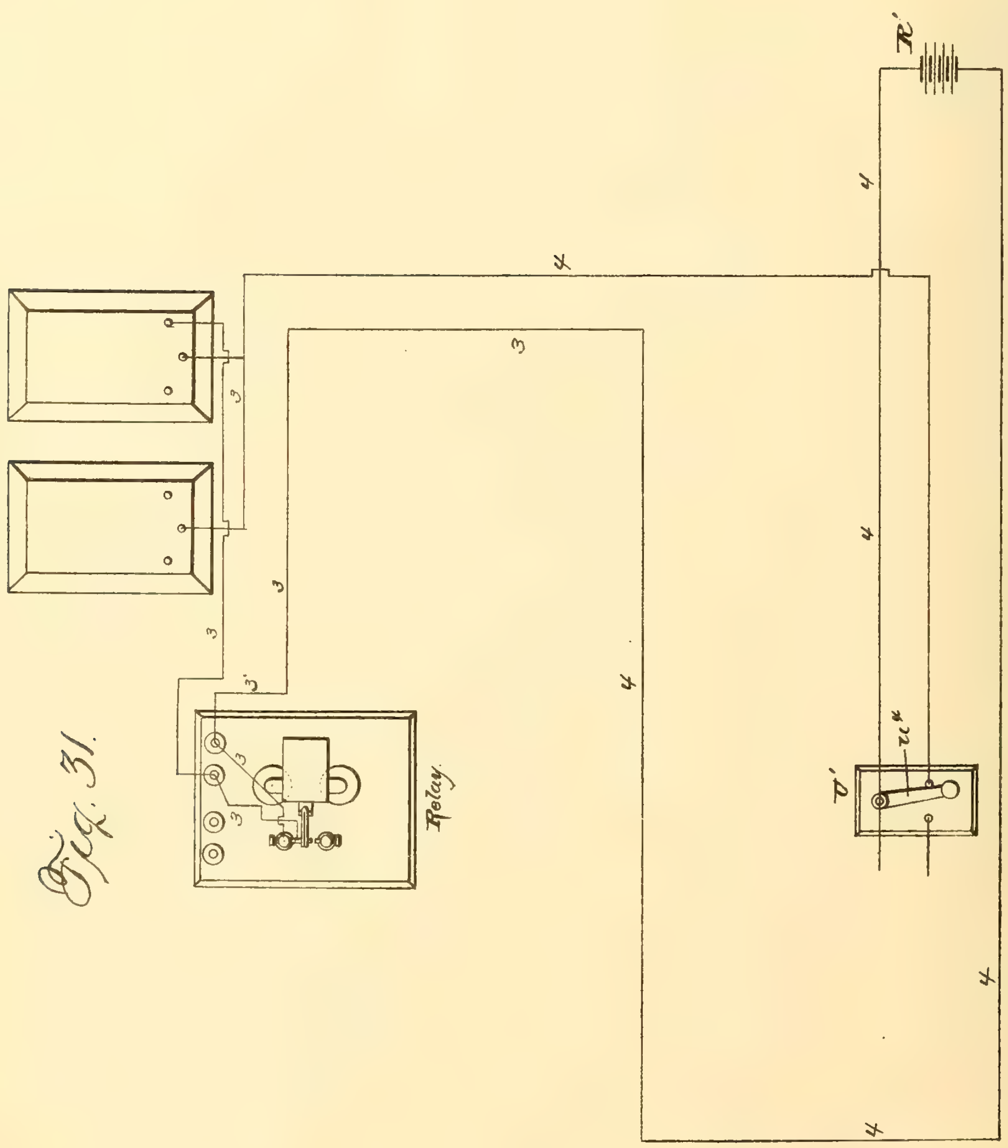

Fig. 31.

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UNITED STATES PATENT OFFICE.

GEORGE E. HUNTER, OF ELGIN, ASSIGNOR TO THE ELGIN NATIONAL WATCH COMPANY, OF CHICAGO, ILLINOIS.

MECHANISM FOR TESTING WATCH-BALANCES AND HAIR-SPRINGS.

SPECIFICATION forming part of Letters Patent No. 490,202, dated January 17, 1893.

Application filed July 2, 1892. Serial No. 438,778. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. HUNTER, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in Mechanism for Testing Watch-Balances and Hair-Springs; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my apparatus in which is shown the relative arrangement of parts and the electric circuits connecting the same; Fig. 2 is a perspective view of the vibrator employed; Fig. 3 is a plan view of the operating mechanism of the same, the top of the casing being removed; Fig. 4 is a central longitudinal section of said vibrator upon line $x\ x$ of Fig. 3; Fig. 5 is a cross section of the same upon line $x'\ x'$, of Figs. 3 and 4; Fig. 6 is a longitudinal section of the balance arbor and shows the arrangement of parts when hair springs are to be tested; Fig. 7 is a plan view in outline of the locking and releasing mechanisms when the vibrating mechanism is locked from motion. Fig. 8 is a like view of the same after the balance staff has been released; Fig. 9 is an enlarged side elevation of the contact springs which are engaged by the contact pin of the balance staff; Figs. 10 and 11 are, respectively, views of the locking plate of the fourth arbor and of the detent actuated thereby, separated; Fig. 12 is a plan view of the mechanism used for actuating the pawl-shaft; Figs. 13 and 14 are, respectively, front and side elevations of the same; Fig. 15 is a perspective view of the registering mechanism preferably used; Fig. 16 is a plan view of the same; Fig. 17 is a plan view of said mechanism from the upper side with the top of the casing removed; Fig. 18 is a plan view of the lower side of the same; Fig. 19 is a longitudinal section upon line $y.\ y.$ of Figs. 16, 17, and 18; Fig. 20 is a plan view in outline of the arresting and releasing mechanism when occupying its normal or locked position; Fig. 21 is a like view of the same when the registering train is free to move; Fig. 22 is a section upon line $y'\ y'$ of Fig. 18 and shows the locking device in engagement with the main wheel of the register train; Fig. 23 is a like view of the same showing said device when released by the hands-setting lever before setting the hands to zero; Fig. 24 is a perspective view of the polarized relay employed; Fig. 25 is a plan view of the same; Fig. 26 is a front elevation of said relay. Fig. 27 is a side elevation of the same; Fig. 28 is a plan of the electric circuit connecting the clock with the magnet coils of the vibrator to release the balance and permit the same to vibrate; Fig. 29 is a like view of the circuit which enables the vibrator to set in operation the register; Fig. 30 is a plan view of the circuit through the clock and relay, and—Fig. 31 is a like view of the circuit through which the clock operates the register.

Letters of like name and kind refer to like parts in each of the figures.

My invention relates to the timing and adjusting of watch balances and hair spring before the same are placed in watch movements, and such invention consists in the apparatus employed, substantially as for the purpose hereinafter specified.

In the carrying of my invention into practice there is necessary a mechanism for vibrating a balance, or hair spring, an indicating or registering mechanism, a time mechanism and certain electrical appliances whereby the said mechanisms may be placed in operation and caused to co-operate so as to furnish accurate data as to the action of the parts being tested.

The time mechanism, which is preferably a standard clock, and the vibrating mechanism are each electrically connected by independent circuits with the indicating mechanism in such manner that either may set the latter in operation according to which first closes the circuit connecting it with such mechanism; or so that either will be effective to set said mechanism in operation should both circuits be closed simultaneously. The clock-controlled circuit is always closed at the expiration of a predetermined interval of time, preferably a minute, while the vibrator-controlled circuit is closed when the balance or spring being tested makes the number of vibrations that a perfect balance or spring would make in such interval. If, therefore, the balance or spring undergoing test be per-

fect, the two circuits will be closed simultaneously; if it be slow, then the vibrator controlled circuit will be closed after the closing of the clock-controlled circuit, while if it be fast, the vibrator controlled circuit will be closed first.

The vibrating mechanism is contained within a casing that is composed of a base section A and a top section A′ that fits upon and is secured to the same, such casing having top, bottom and sides, and rounded ends. Midway between the base and top sections, A and A′, respectively, is a plate B which is arranged parallel with said parts and between the same and said base are journaled the parts of an ordinary time train that consists of a main arbor C that has a toothed wheel c and is caused to rotate by means of a weight-actuated drum, a second arbor D having a pinion d and a toothed wheel d', a third arbor E provided with a pinion e and toothed wheel e', a fourth arbor F having a pinion f and toothed wheel f', a fifth arbor G provided with a pinion g and escape wheel g', a sixth arbor H carrying a pallet lever h and a balance arbor or staff I which staff is journaled within said lower section, extends through said plate and has its upper end journaled in a bridge K that is secured upon the latter.

When used for testing balances, the staff I is provided with a standard hair spring L that is located below the bridge K, and upon its upper pivot carries a crotch i that is adapted to receive a balance M, and support the same in proper position, when it becomes a part of and completes the time train. When the vibrator is employed for testing hair springs a standard balance is secured upon said staff below said bridge, and the upper end of the latter adapted to receive a hair spring L.

When a spring or balance has been placed in position it is desired that the balance staff should be capable of instant vibration, and that when it has vibrated a predetermined number of times, it shall complete an electric circuit at the point from which it started. To effect this there is secured to said staff, above the plate B, a radial pin i', and within the plane of vibration of such pin are two flat springs N and N that are secured upon one end of a lever O which is pivoted near its opposite end and is adapted to be moved upon its pivot so as to cause said springs to be placed within the track of said pin, or to remove them from such track. Said springs are the terminals of an electric circuit and are arranged with their outer ends nearly parallel and separated by a distance less than the diameter of said pin so that when they are moved inward, the latter will pass between and engage with said springs, closing the circuit and arresting the motion of the balance staff.

The lever O is held normally in position to arrest motion of the balance staff I by means of a spring P that is arranged to engage with and press outward upon its rear end, but is moved to the opposite limit of its motion by means of a shaft Q which is journaled vertically within the base section A and plate B and at its upper end is provided with a pawl q that when such shaft is rotated in one direction is adapted to engage with the rear end of said lever and move the same inward, while when said shaft is rotated in an opposite direction said pawl will trip over said lever end. Said shaft is held at the rearward limit of its rotary motion by means of a radially arranged spring q', and is moved in an opposite direction by an armature q^2 which is secured radially upon the shaft and is acted upon by two electro-magnets R and R that are suitably arranged with reference thereto. When the lever O has been moved to position to release the balance staff, it is locked in such position by means of a detent S that is pivoted upon a bridge T near the center or fourth arbor F and at one end is provided with a notch s which is adapted to engage with a pin o that projects upward from said lever. The shape of the notch is such as to cause the pin to automatically move said detent into position for engagement as said lever is turned to release the balance staff. At the completion of the predetermined number of vibrations of the balance staff the detent S is released from engagement with the pin o and the lever O automatically returns to its normal position and thus causes the springs N and N to engage with the pin i and arrest the motion of said staff. Such release is effected by means of a plate U which is secured upon and rotates with the fourth arbor F and is provided with a pin u, that at the desired instant, engages with a similar pin s' upon said detent and moves the latter in the direction necessary for disengagement from said pin o. At the instant when the lever O returns to its normal position a shoulder u' upon the plate U engages with a lug o^2 upon said lever and operates to arrest the motion of the time train and to thus relieve the balance staff from all injurious shock or strain. In order that the engagement between said plate and lever may be effected at the precise instant desired, a cylindrical plate V is fastened upon the arbor F upon which said plate U is fitted so as to embrace about three-fourths of its periphery and be held thereon by friction. One side of the plate U is made open as shown, and is provided with two arms u^2 and u^3 between which is placed a screw W that has its ends in engagement with the contiguous faces of said ends and its threaded body contained within a threaded lug v which is formed upon and extends radially from said plate V. As thus arranged by turning said screw it will be moved lengthwise through said boss and cause said plate U to be turned upon said plate V so as to change the position of the shoulder u' with relation to the arbor F. The springs N and N, not only act as stops to arrest the motion of the balance arbor, but also as circuit closers, for which purpose the lower spring is insulated from

the other and connected electrically with an insulated binding post X by a wire x, while the upper spring is secured directly upon the lever O and through the same and the casing, or by any usual means, is in connection with a second binding post X′. As thus arranged it will be seen that when the pin i passes between the ends of said springs an electric connection is instantly produced.

The registering mechanism is inclosed within a casing Y which has the form shown in Figs. 15, 16 and 17 and is supported and secured upon a hollow base Z that in turn rests upon and is attached to a bench or other suitable support. Within said casing is journaled a vertical, hollow arbor A^2, which upon its upper end carries a hand a that by the rotation of said arbor will be caused to move over a circular dial B′ which is secured upon the upper side of the casing and is provided with fifty equal divisions b, b, &c. Within said hollow arbor is journaled an arbor C′ which extends downward into the hollow base Z and upon its upper end has secured a hand c' that is longer than said hand a and when said arbor is rotated travels over a second series of divisions b', b', &c, numbered from one to one hundred which are provided upon said dial.

Journaled at one side of and parallel with the arbors A^2 and C′ is an arbor D′ that carries a toothed wheel d^2 and a pinion d', the first of which parts meshes with and receives motion from a pinion c^2 that is secured upon said arbor C′, while said pinion d' meshes with and imparts motion to a toothed wheel a' which is carried by said arbor A^2, the relative dimensions of said pinions and wheels being such as to cause the shorter hand a to move forward one degree for each complete rotation of the longer hand c'.

The engagement between the pinion c^2 and the arbor C′ and the wheel a' and the arbor A^2 is produced by friction so that each arbor is capable of being independently turned in order to set the hands at zero. This is effected by means of two heart-shaped cams a^2 and c^3 which are secured, respectively, upon said arbors A^2 and C′ and are simultaneously acted upon by the arms e' and e' of a lever E′ that is journaled within the casing and operated by means of a knob e^2 that projects through a slot y in the upper side of the casing Y.

The register mechanism is driven by any suitable motor through the arbor C′ for which purpose there is secured to the lower projecting end of the latter a toothed wheel c^4 that is adapted to be engaged by an intermediate toothed wheel F′ which is pivoted upon one end of a pivoted bar G′ and is in constant engagement with a motor driven wheel H′ the arrangement being such as to enable said wheels c^4 and F′ to be engaged or disengaged by the movement of said bar upon its pivotal bearing. The bar G′ is by means of a spring g' held normally in such position as to cause the wheels c^4 and F′ to be disengaged and is moved in an opposite direction by means of an armature I′ which is secured to an arm g^2 that extends laterally from said bar. Said armature is moved by means of an electro-magnet K′ in the usual way, but for purposes hereinafter stated, each coil of such magnet is made double so that when currents of electricity having equal strength are passing at the same time and in opposite directions through each wire they will neutralize each other and produce no magnetism, but if one current is interrupted, then the other current will act with full effect and the armature will be attracted.

It is necessary that the registering mechanism shall be locked from movement when not intentionally caused to operate, for which purpose there is employed a detent L′ that is arranged to be moved vertically into and out of engagement with the teeth of the wheel c^4 of the arbor C′ and by spring pressure, is held normally at the upper limit of its motion in engagement with said wheel. When the hands are being set at zero, said detent is moved out of engagement by means of an inclined portion of the arms e^2 of the cam lever E′ which arm passes over the end of said detent and moves the same downward just before the impinging of the arm e' upon the cam c^3. As soon as said cam lever is released and returns to its normal position, said detent automatically engages again with said wheel c^4. A laterally adjustable clamp l' engages with said detent and enables it to be moved so as to cause it to exactly coincide with the teeth of said wheel. To permit of the disengagement of said detent at the instant a connection is made between the motor and registering mechanism, it is secured upon, and supported by the arm g^2 of the bar G′, and with such arm is moved horizontally away from the wheel c^4 by the action of the electro-magnet upon the armature I′.

In order that it may be indicated which of the two currents sets the registering mechanism into operation, there is pivoted at one end within one end of the casing y a bar M′ which upon its opposite, free end carries a plate or dial m' that by movement of said lever upon its pivotal bearing may be caused to move horizontally to a limited distance beneath a glazed opening y' in the top of said casing. Upon such dial are the conventional signs for the terms plus and minus (+ and −) and by the movement of said bar to the limit of its motion in one direction one of said signs will be brought into sight, while when the bar is in its other position, the other sign is in view. Two electro-magnets N′ and N^2 act upon the bar M′ one of which magnets is placed upon each side thereof near its pivoted end and opposite to an armature. Each of these coils forms part of one of the electric circuits of the magnet K′ and it will be obvious that, whichever one (N′ or N^2) receives the current first, it will be able to hold the bar M′ in opposition to the magnetism in-

duced in the other coil by a current of the same strength, and the sign then exposed will indicate which circuit was first closed. Another portion of the system is a polarized relay O′ which has the usual construction, and is connected electrically—through a standard clock P′—with a battery Q′ so as to enable such clock to control and cause its armature o^3 to close or open either of two circuits, and thus connect either of two sets of registers with another battery R′.

The mechanisms described may occupy any desired relative positions, but as shown in Fig. 1. the arrangement is preferably as follows, viz:—Two or more vibrators for each set are arranged side by side upon a suitable support, and a like number of registers is located conveniently near, preferably upon the opposite side of a bench or table. Midway between said vibrators and registers is placed the polarized relay, a double switch S′ having two levers s^2 and s^3 is placed in front of said relay, a circuit-closer T′ having two keys t' and t^2, is next in order and a switch U′ having a single lever u' is placed in front of said circuit closer. The standard clock P′ has a mercurial contact mechanism p' at the lower end of its pendulum which operates to connect electrically with a battery Q′, the magnets R and R that actuate the pawl shafts Q and Q of one set of vibrators, such connection being made through the switch S′ and circuit closer T′ as shown in Fig. 28, and for convenience being designated No. 1. From the switch a second circuit, No. 2, branches off from No. 1 and extends to each of the magnet coils of the relay O′, as seen in Fig. 30, by which means a current from the battery Q′ may be caused to pass through either of said coils and thus move the armature to cause its contact piece o^4 to close a third circuit No. 3, which circuit No. 3, shown in Fig. 31 is formed by a wire that extends from the battery R′, to the relay O′ where it is connected with one of the fixed contacts o^5 and o^6 of said relay and with the contact o^4 of its armature, and from thence passes to and includes the magnet K′ of each register of the set and from thence through the switch U′ back again to said battery, while a fourth circuit No. 4 extends from the battery R′ through the switch U′ to the registers, then around the coils of each magnet, thence to each vibrator, and from thence back to said battery, the arrangement being such that each register is connected electrically with one vibrator of the set so that while the same circuit is employed for all of each set, the action of each is independent of the others. The operator now places balances or hair springs in position in one set of vibrators, and then manipulates the key t' of the circuit closer T′ which causes the next beat of the clock to send a current through the clock circuit No. 1 so as to release the time train of each vibrator and permit the same to instantly commence movement, after which, by means of the switch U′, the battery R′ is thrown into circuit upon the same side of the apparatus in readiness for use when needed. Just before the expiration of one minute, the operator moves the lever s^3 of the switch S′ so as to connect the clock with the relay—by circuit No. 2.—when the last beat of the minute from said clock sends a current from the battery Q′ through the magnet coils of said relay and closes the circuit No. 3 between the battery R′ and the registers upon that side through the contact o^5 of said relay. If either of the balances or hair springs being tested, is slow, the hands of the connected register will instantly commence to turn and will continue in motion until the balance has completed three hundred vibrations, when the contact springs N and N will be moved into engagement with the pin of the balance staff and closing circuit No. 4 between the vibrator and register will neutralize the current of circuit No. 3 upon the magnets of said recorder and operate to instantly arrest the motion of its hands. The position of said hands will indicate the number of seconds of variation of the balance, or spring in twenty four hours and the appearance of the —, or minus sign will show that said balance or spring is slow. Should a balance or spring be fast the vibrator controlled circuit No. 4 will be closed at the expiration of the time required for the balance to make three hundred vibrations, and the hands of the register will be instantly started and continue to run until their motion is arrested by the clock circuit No. 3 at the expiration of one minute, when the +, or plus sign will be shown, and the position of said register hands will indicate the number of seconds which the balance or spring is fast in twenty four hours. If the balance or spring be perfect, then it will complete its three hundred vibrations exactly in a minute, and accordingly the vibrator controlled circuit will be closed simultaneously with the clock-controlled circuit, and since the two currents flowing through the coils of the magnets K′, K′ will neutralize each other the register will not be set in motion.

The method practiced in using the herein-described mechanism is not claimed herein but is made the subject matter of another application filed July 2 1892: Serial No. 438,778.

Having thus described my invention what I claim is.

1. As an improvement in apparatus for testing balances and hair springs in combination, a balance or hair spring vibrating mechanism, a standard time piece and an indicating mechanism connected with both the time piece and with the vibrating mechanism to show the relation between them at the end of a predetermined interval of time, substantially as and for the purpose set forth.

2. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or hair spring vibrator, a standard

time piece, an indicating mechanism, and electrical connections between each of the former and said indicating mechanism, whereby the latter may have its movements, controlled by either of the others, substantially as and for the purpose shown.

3. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or hair spring vibrator, a standard time piece, a circuit connecting these two, whereby the time piece can start the vibrator, and a register in electrical connection with and having its movements controlled by said vibrator and said time piece, substantially as and for the purpose specified.

4. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or hair spring vibrator, a standard time piece, an electric circuit connecting these two, whereby the time piece can start the vibrator, an indicating mechanism, an electric circuit having a make and break device controlled by the time piece to start said indicating mechanism and a third circuit having a make and break device controlled by the vibrator by which said mechanism may also be started, substantially as and for the purpose shown and described.

5. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or hair spring vibrator, a standard time piece, an electric circuit connecting these two, whereby the time piece can start the vibrator, an indicating mechanism, an electric circuit having a make and break device controlled by the time piece to start said indicating mechanism, a third circuit between the vibrator and the indicating mechanism and the vibrator stopping device adapted to make and break said third circuit, substantially as and for the purpose described.

6. As an improvement in apparatus for testing balances and hair springs, in combination, a vibrating mechanism, a standard clock, an electric circuit connecting these two whereby the time piece can start the vibrator, an indicating mechanism, an electric circuit having a make and break device controlled by the time piece to start said indicating mechanism, a third circuit between the vibrator and the indicating mechanism and the circuit closer carried by the balance arbor of the vibrator, substantially as and for the purpose set forth.

7. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or spring vibrating mechanism, a standard time piece, an indicating mechanism connected with both of the former and adapted to be actuated by either and means to indicate by which of the same it is actuated.

8. As an improvement in apparatus for testing balances and hair springs, in combination, a balance or spring vibrating mechanism, a standard time piece, an indicating mechanism, an electric circuit connecting each of the former with said indicating mechanism to enable either to actuate it, and means to indicate which does actuate it, substantially as and for the purpose shown.

9. As an improvement in apparatus for testing balances and hair springs in combination with the doubly coiled electro-magnet, an electro magnet in circuit with each of said coils, an armature subject to the influence of both of the latter magnets, and an independent circuit closing device for each circuit through the double coils, substantially as and for the purpose specified.

10. As an improvement in apparatus for testing balances and hair springs in combination with a magnet adapted to be traversed by opposing electric currents and the mechanism to be influenced by the same, when but one current is traversing it, an indicator to denote which current is the traversing current and an independent circuit closing device to establish each current, substantially as and for the purpose set forth.

11. As an improvement in apparatus for testing balances and hair springs in combination with the doubly coiled electro magnet, an electro magnet in circuit with each coil of the same, the indicator whose movements are controlled by the last named magnets and an independent circuit closing device to close the circuit through each of the double coils, substantially as and for the purpose described.

12. As an improvement in apparatus for testing balances and hair springs in combination a balance or spring vibrating mechanism, a standard time piece, an indicating mechanism, the magnet for controlling the operation of the latter, in a circuit controlled by the time piece and one controlled by the vibrator, another magnet in each of said circuits and an indicator adapted to be actuated by either of said last named magnets, substantially as and for the purpose shown and described.

13. A system for testing balances and hair springs, comprising a standard time piece, two sets of vibrators and indicators, a polarized relay, a circuit including the indicators and the relay and a circuit between the time piece and the relay, substantially as and for the purpose specified.

14. A system for testing balances and hair springs comprising a standard time piece, two sets of vibrators and indicators, a polarized relay, a circuit including the said time piece, and the vibrators, a circuit including the said time piece and the relay, a circuit including the relay and the indicators and a circuit including the indicators and the vibrators of a set, substantially as and for the purpose described.

15. In combination with a train for vibrating a balance wheel or hair spring, a stopping device adapted to operate on the balance arbor and on an arbor intermediate it and the going arbor, substantially as and for the purpose shown and described.

16. In combination with a train for vibrating a balance wheel or a hair spring, a piv-

oted lever for stopping the same adapted to operate simultaneously upon the balance arbor and upon an arbor intermediate it and the going arbor, substantially and for the purpose shown—

17. In apparatus for testing balances and hair springs in combination with a train for vibrating a balance or a hair spring the device for stopping the same and controlling an electric circuit and an indicating mechanism in said circuit substantially as and for the purpose described—

18. In apparatus for testing balances and hair springs in combination with a train for vibrating a balance or a hair spring, a pivoted arm adapted to simultaneously stop the same and close an electric circuit, and an indicating mechanism in said circuit substantially as and for the purpose shown and described—

19. In combination with a train for vibrating a balance or a hair spring, one of whose arbors carries a plate, an arm movable into and out of engagement with said plate to stop the train and a locking device to hold such arm out of engagement with the same—

20. In combination with a train for vibrating a balance or a hair spring, a pivoted arm movable into and out of the path of a pin carried by the balance arbor to stop and allow the same to start and to close and open an electric circuit, substantially as and for the purpose set forth.

21. In combination with one of the wheels of a registering mechanism, a detent to lock said wheel, the wheel movable into and out of engagement with the latter for communicating motion from a motor to it, and the mechanism for moving said movable wheel into and out of its engagement and moving said detent into and out of locking engagement, substantially as and for the purpose shown—

22. In combination with one of the wheels of a registering mechanism and the means for setting the hands thereof to zero, a detent to lock said wheel, the wheel movable into and out of engagement with the latter for communicating motion from a motor to it, and the mechanism for moving said movable wheel into and out of its engagement, such mechanism and the hands setting means both operating to move said detent into and out of locking engagement, substantially as and for the purpose specified—

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of May, 1892.

GEORGE E. HUNTER.

Witnesses:
GEO. S. PRINDLE,
W. H. CLOUDMAN.

(No Model.)

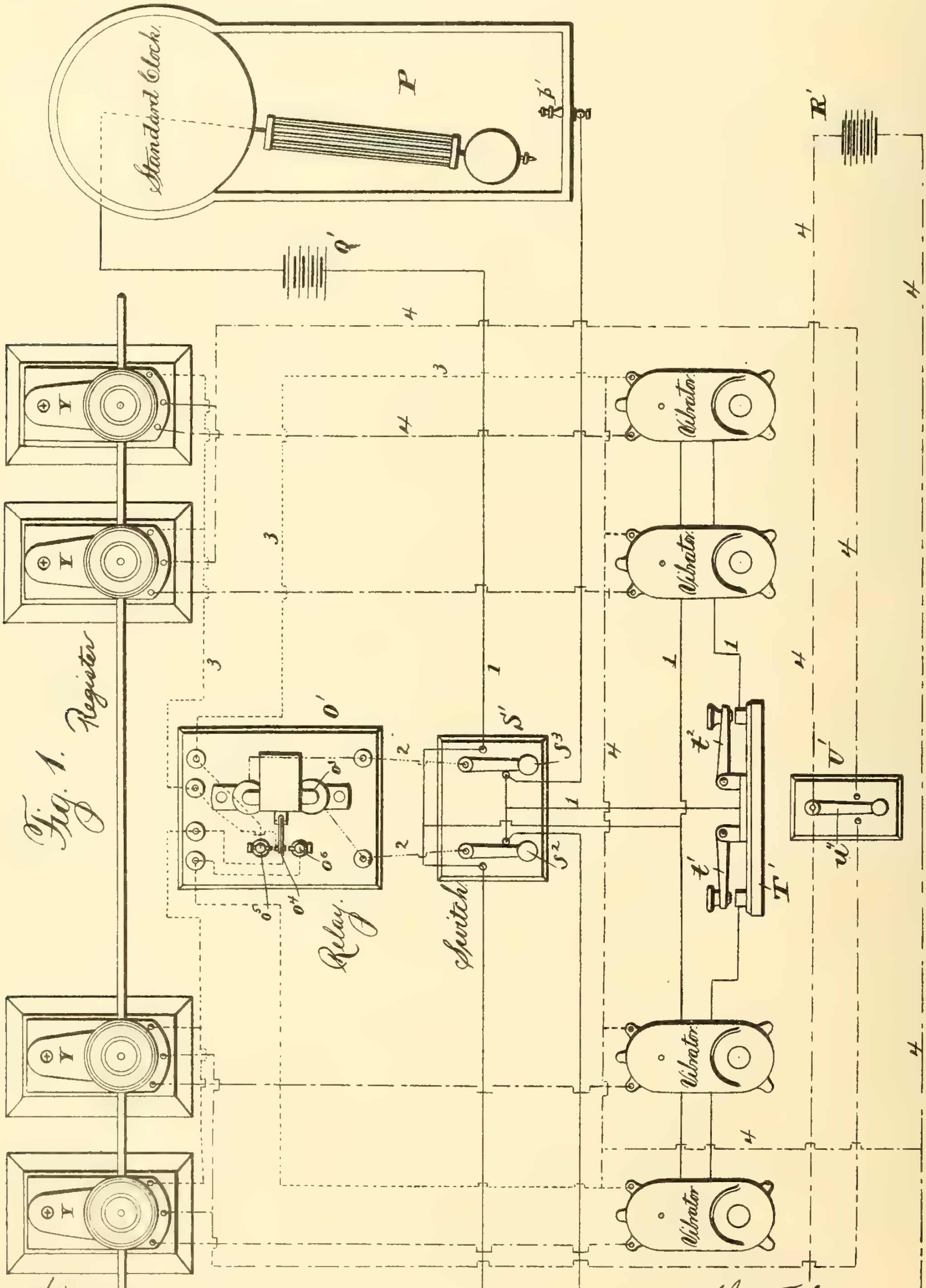
10 Sheets—Sheet 1.

G. E. HUNTER.

METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 490,203.

Patented Jan. 17, 1893.



Witnesses
Jas E Hutchinson
Henry C. Hazard

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(No Model.) 10 Sheets—Sheet 2.

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METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

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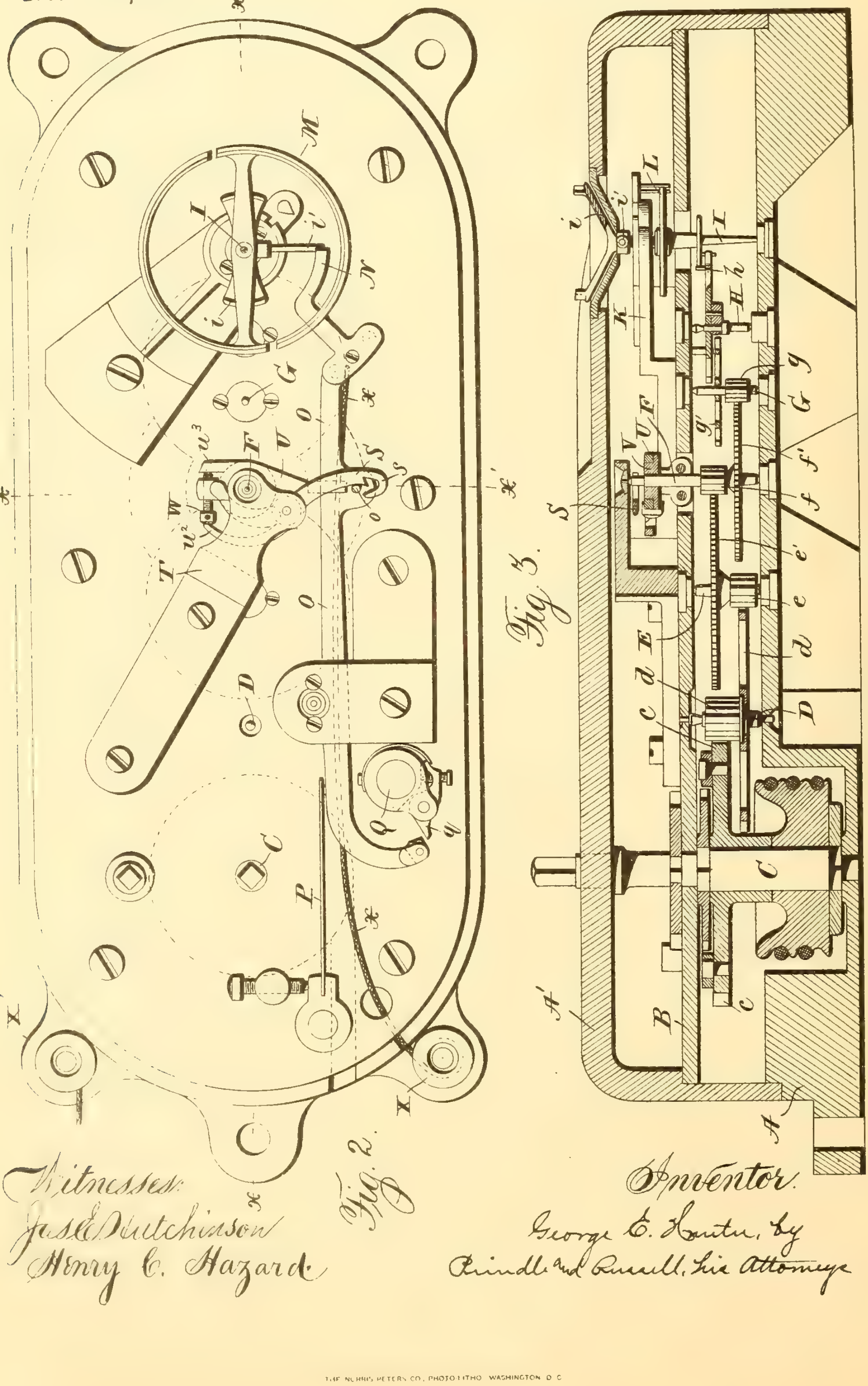

Fig. 2. Fig. 3.

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G. E. HUNTER.

METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

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Fig. 4.

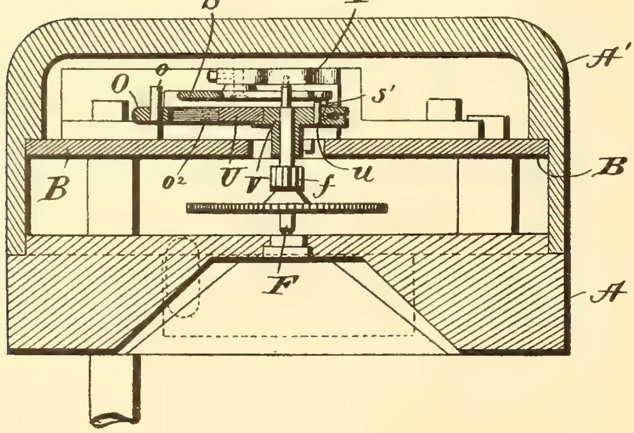
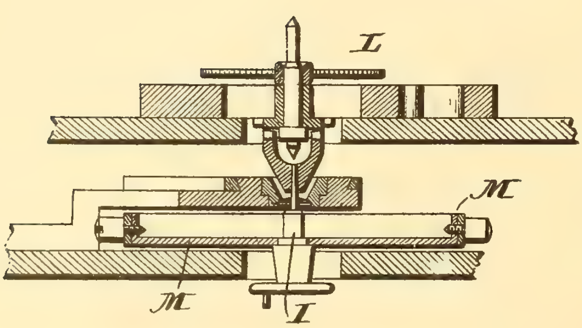


Fig. 5.



Witnesses:
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(No Model.) 10 Sheets—Sheet 4.

G. E. HUNTER.

METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

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Fig. 6

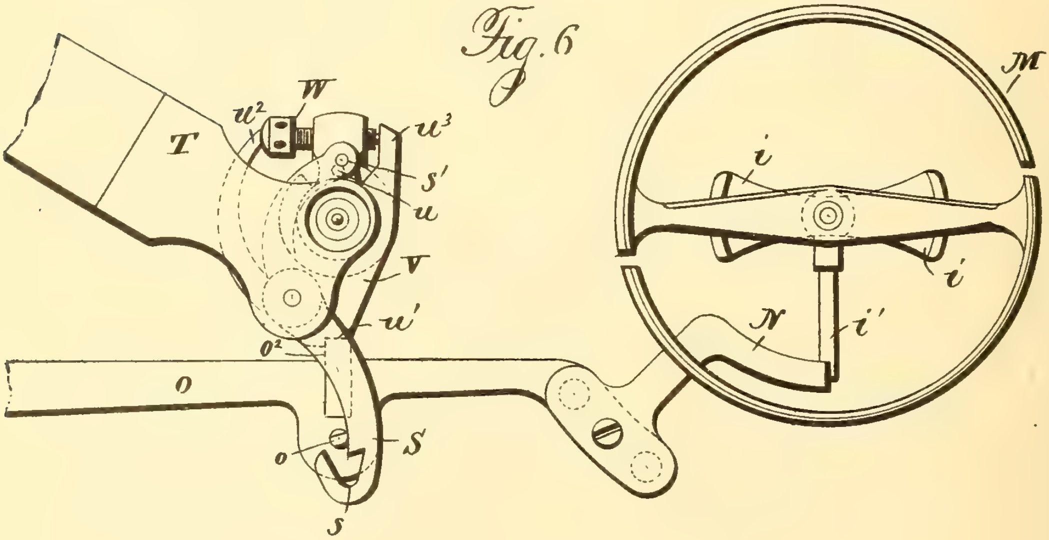


Fig. 7.

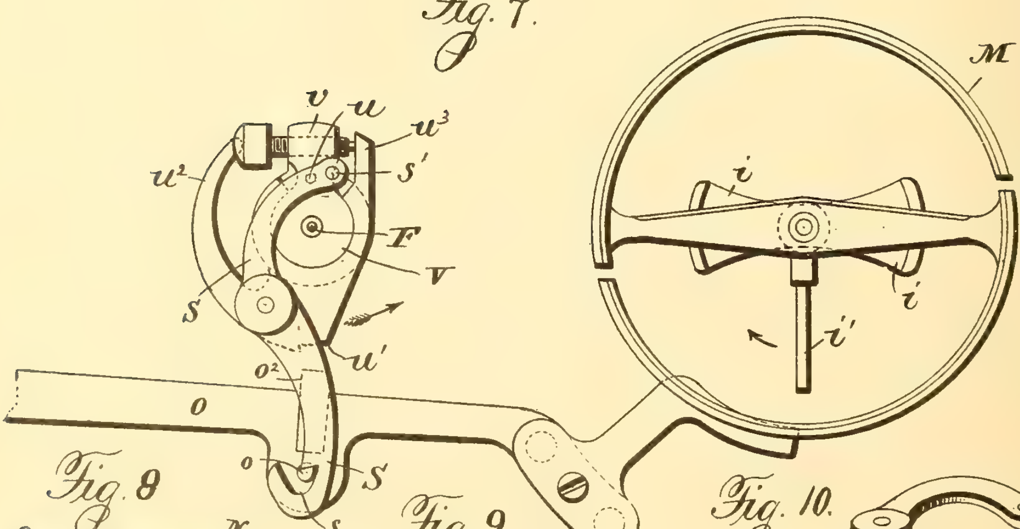


Fig. 8

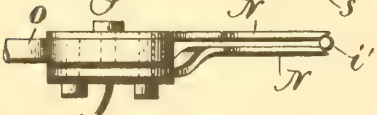


Fig. 9

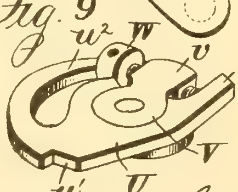
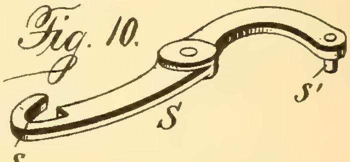


Fig. 10.



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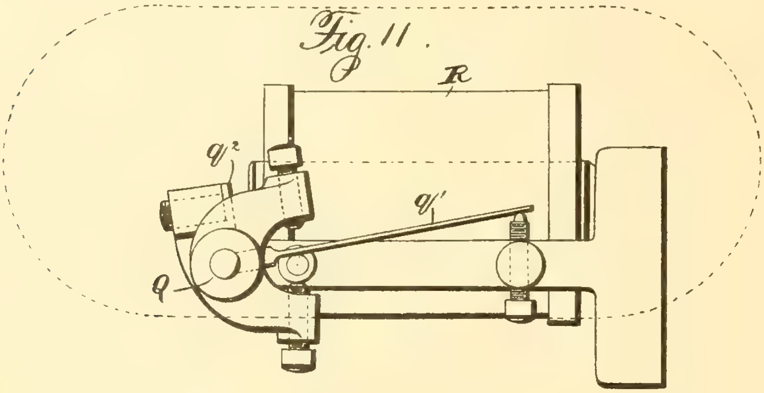
G. E. HUNTER.

METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 490,203. Patented Jan. 17, 1893.

Fig. 11.



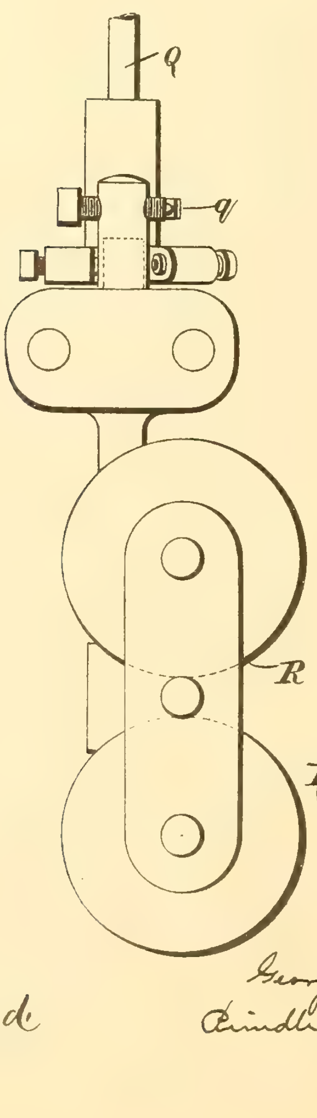


Fig. 12.

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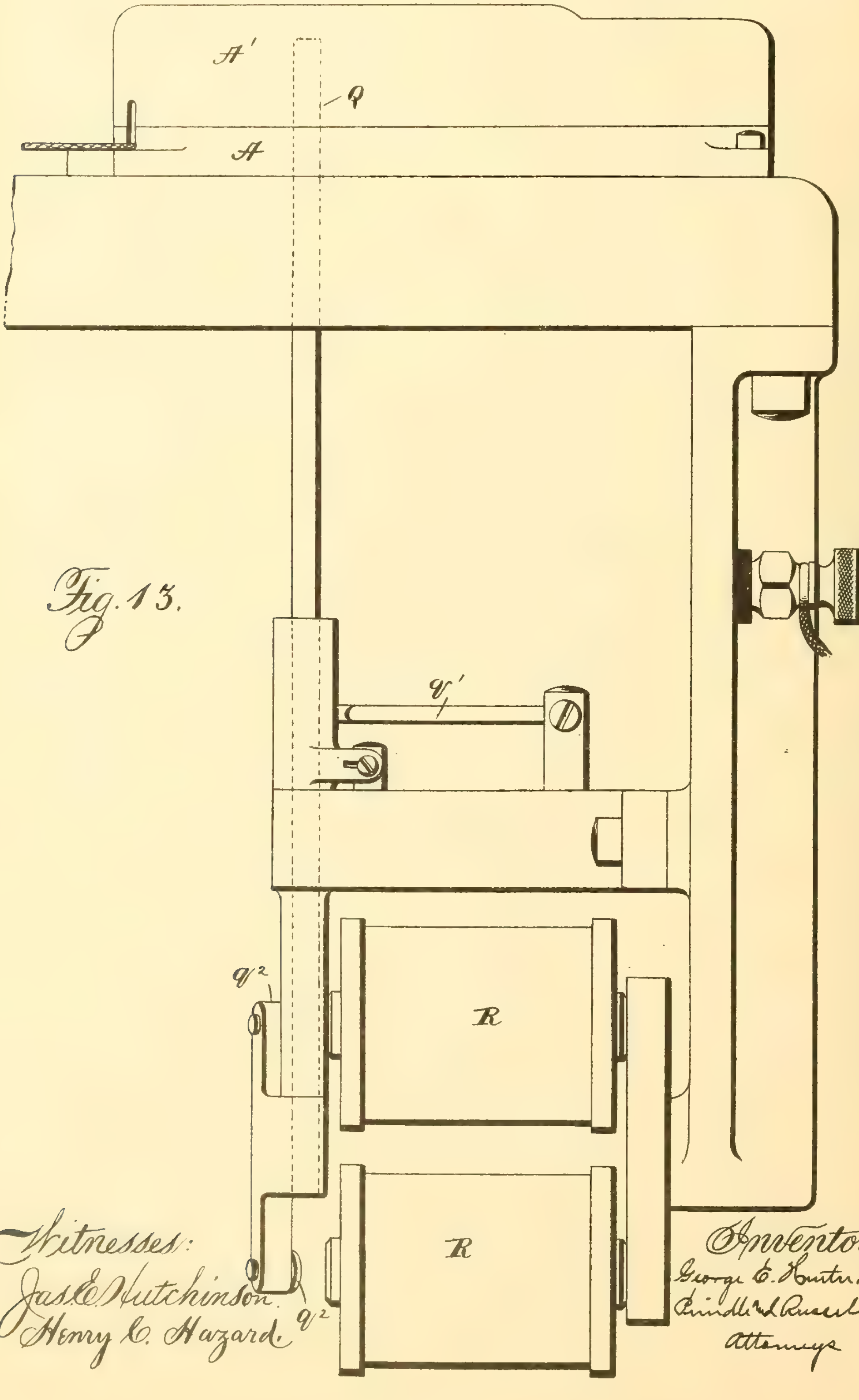

Fig. 13.

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G. E. HUNTER.

METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

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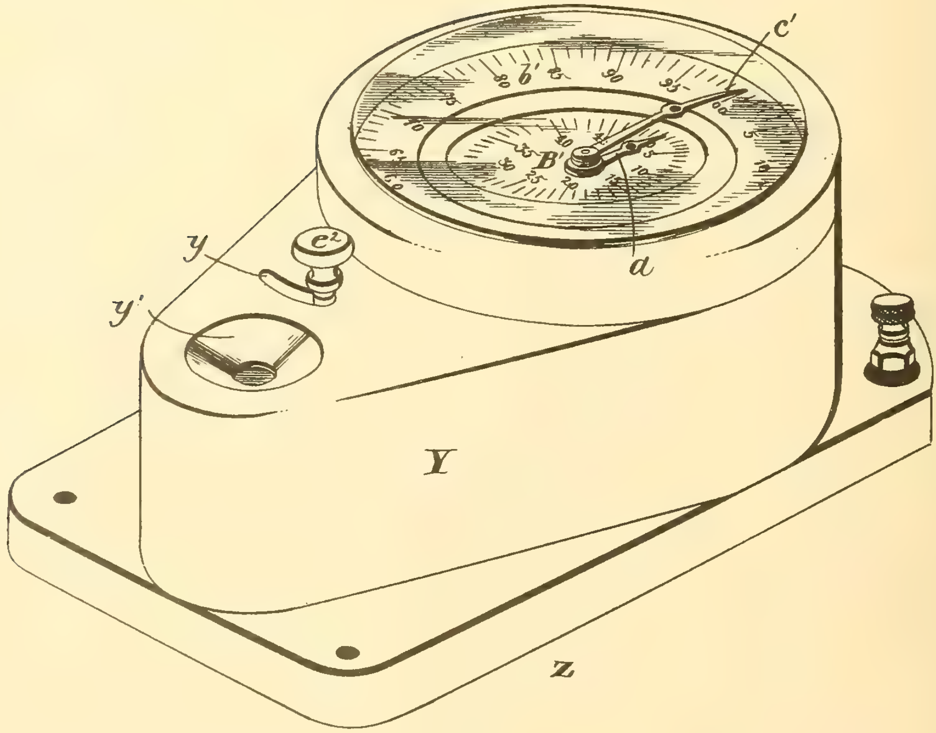
Fig. 14.



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(No Model.) 10 Sheets—Sheet 8.

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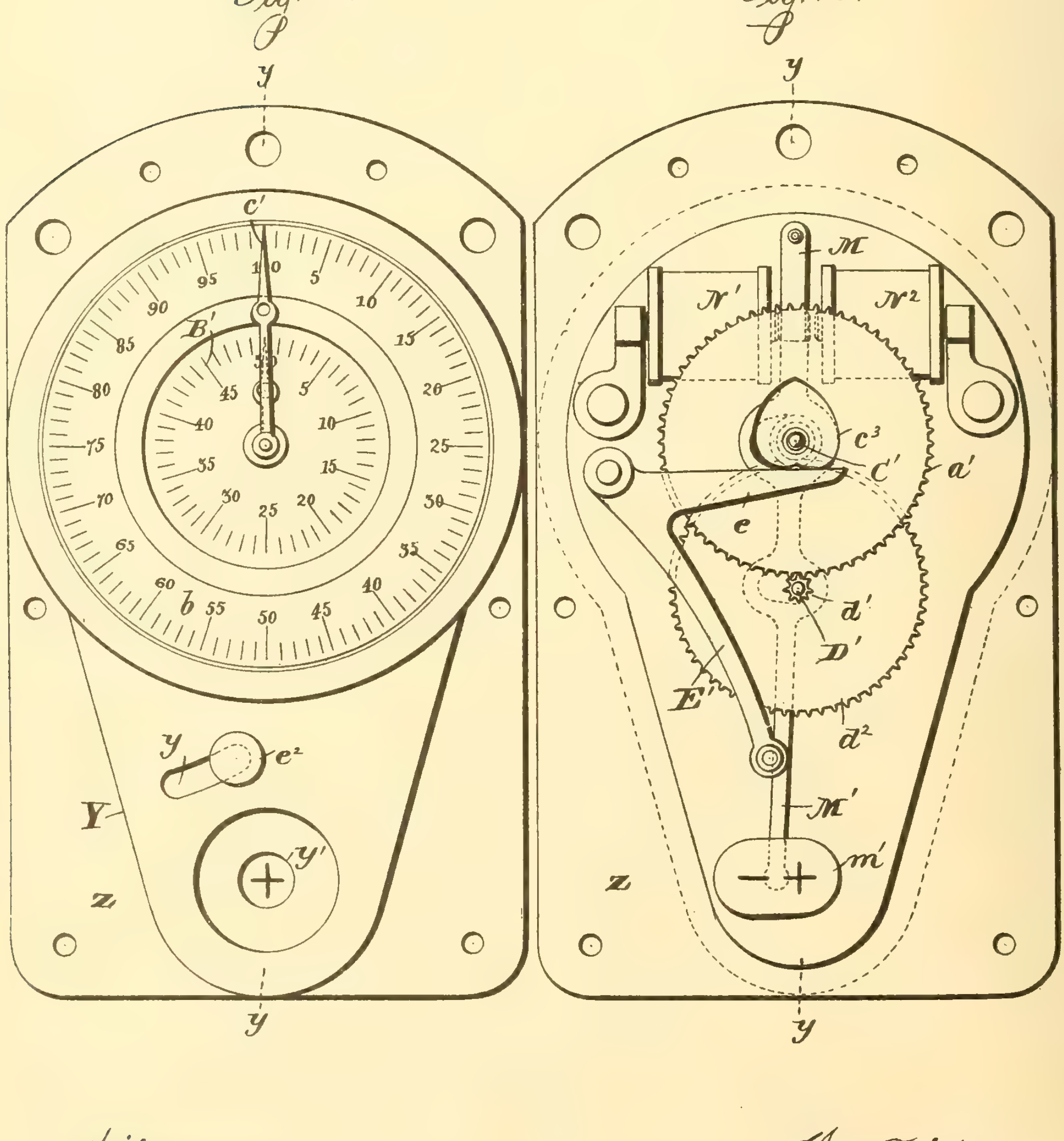
METHOD OF TESTING WATCH BALANCES AND HAIR SPRINGS.

No. 490,203. Patented Jan. 17, 1893.

Fig. 15.

Fig. 16.



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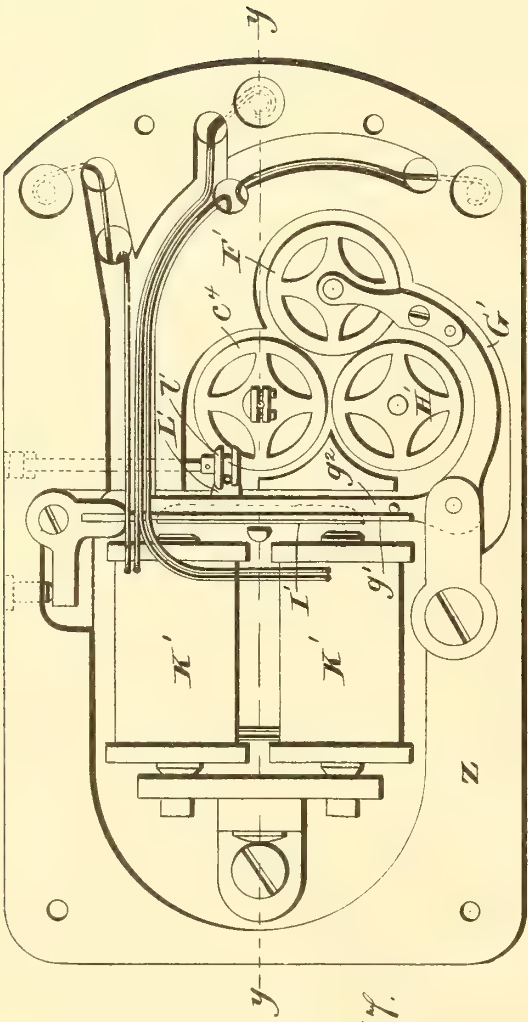

Fig.17.

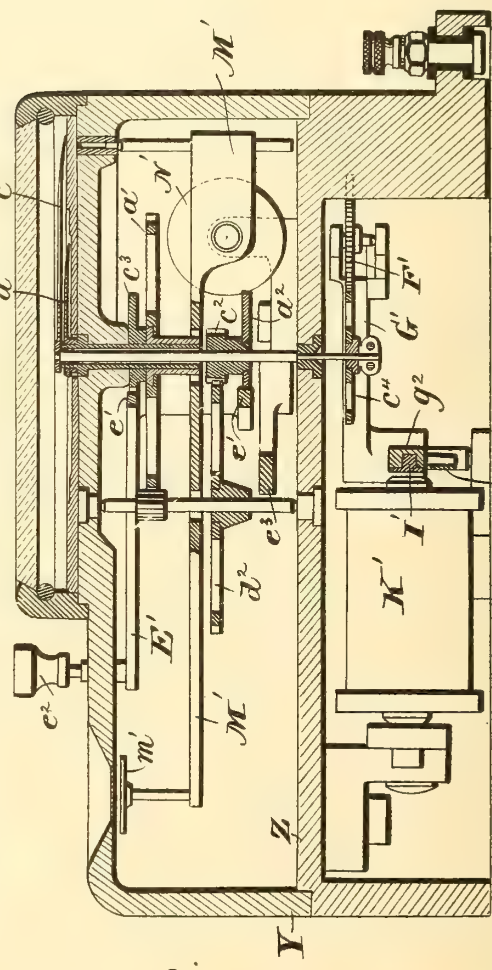

Fig.18.

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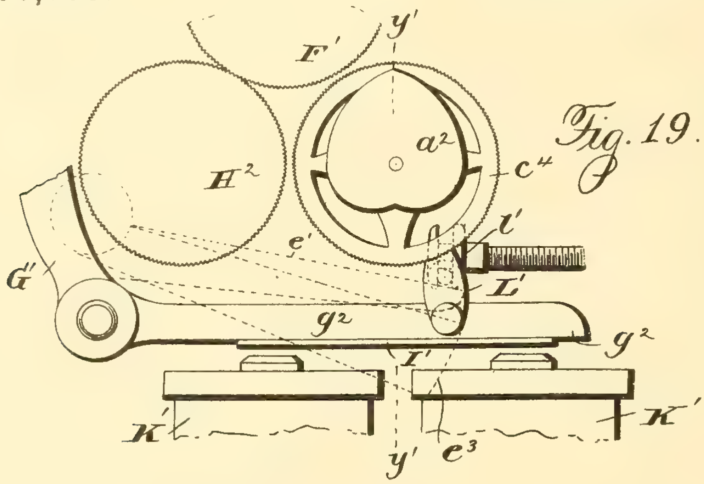


Fig. 19.

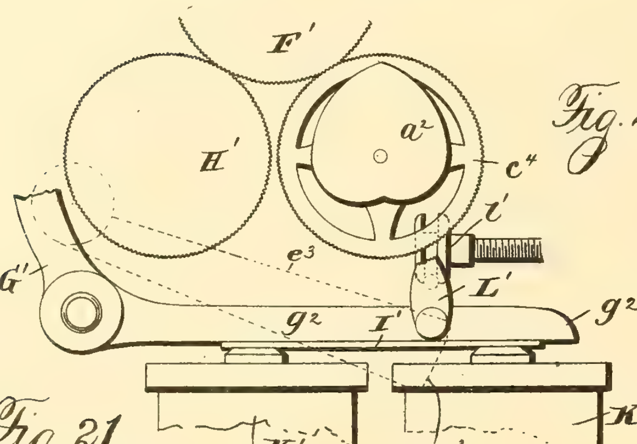


Fig. 20.

Fig. 21.

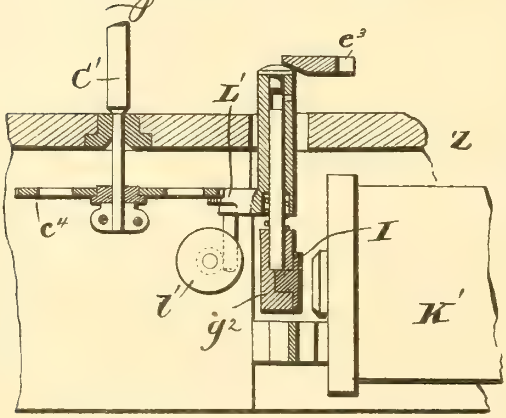
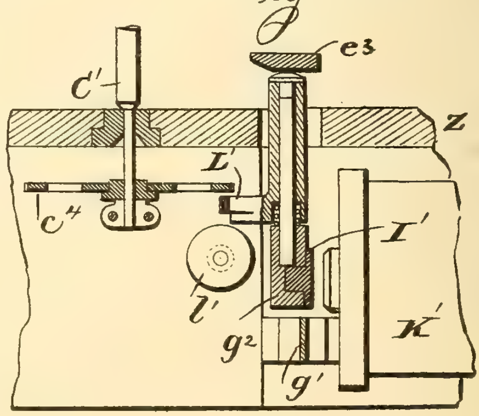


Fig. 22.



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UNITED STATES PATENT OFFICE.

GEORGE E. HUNTER, OF ELGIN, ASSIGNOR TO THE ELGIN NATIONAL WATCH COMPANY, OF CHICAGO, ILLINOIS.

METHOD OF TESTING WATCH-BALANCES AND HAIR-SPRINGS.

SPECIFICATION forming part of Letters Patent No. 490,203, dated January 17, 1893.

Application filed July 2, 1892. Serial No. 438,779. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. HUNTER, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useul Improvements in Methods of Testing Watch-Balances and Hair-Springs; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my apparatus in which is shown the relative arrangement of parts and the electric circuits connecting the same; Fig. 2 is a plan view of the operating mechanism of the vibrator employed the top of the casing being removed; Fig. 3 is a central longitudinal section of said vibrator upon line x—x of Fig. 2; Fig. 4 is a cross section of the same upon line x'—x' of Figs. 2 and 3. Fig. 5 is a longitudinal section of the balance arbor and shows the arrangement of parts when hair springs are to be tested; Fig. 6 is a plan view in outline of the locking and releasing mechanisms when the vibrating mechanism is locked from motion; Fig. 7 is a like view of the same after the balance staff has been released; Fig. 8 is an enlarged side elevation of the contact springs which are engaged by the contact pin of the balance staff; Figs. 9 and 10 are, respectively, views of the locking plate of the fourth arbor and of the detent actuated thereby, separated from each other; Fig. 11 is a plan view of the mechanism used for actuating the pawl shaft; Figs. 12 and 13 are respectively front and side elevations of the same; Fig. 14 is a perspective view of the registering mechanism preferably used; Fig. 15 is a plan view of the same; Fig. 16 is a like view of said mechanism from the upper side with the top of the casing removed; Fig. 17 is a plan view of the lower side of the same; Fig. 18 is a longitudinal section upon line y—y of Figs. 15, 16, and 17; Fig. 19 is a plan view in outline of the arresting and releasing mechanism when occupying its normal or locked position; Fig. 20 is a like view of the same when the registering train is free to move; Fig. 21 is a section upon line y'—y' of Fig. 20 and shows the locking device in engagement with the main wheel of the register train; Fig. 22 is a like view of the same showing said device when released by the hands-setting lever before setting the hands to zero.

Letters of like name and kind refer to like parts throughout the several figures.

My invention relates to the timing and adjusting of watch balances and hair springs before the same are placed in watch movements, and such invention consists in the process employed, substantially as and for the purpose hereinafter specified.

In the carrying of my invention into practice there is necessary a mechanism for vibrating a balance, or hair spring, an indicating or registering mechanism, a time mechanism and certain electrical appliances whereby the said mechanisms may be placed in operation and caused to co-operate so as to furnish accurate data as to the action of the parts being tested. Various forms and construction of mechanical appliances may be employed, but it will sufficiently illustrate my invention to show the operation of the mechanism preferably used, commencing with the vibrator, which is contained within a casing that is composed of a base section A and a top section A′ that fits upon and is secured to the same, such casing having top, bottom and sides, and rounded ends.

Midway between the base and top sections, A and A′, respectively, is a plate B which is arranged parallel with said parts, and between the same and said base are journaled the parts of an ordinary time train that consists of a main arbor C that has a toothed wheel c and is caused to rotate by means of a weight-actuated drum, a second arbor D having a pinion d and a toothed wheel d', a third arbor E provided with a pinion e and toothed wheel e', a fourth arbor F having a pinion f and toothed wheel f', a fifth arbor G provided with a pinion g and escape wheel g' a sixth arbor H carrying a pallet lever h and a balance arbor or staff I which staff is journaled within said lower section, extends through said plate, and has its upper end journaled in a bridge K that is secured upon the latter.

When used for testing balances, the staff I is provided with a standard hair spring L that is located below the bridge K, and upon its upper pivot carries a crotch i that is adapted

to receive a balance M, and support the same in proper position, when it becomes a part of and completes the time train. When the vibrator is employed for testing hair springs a standard balance is secured upon said staff below said bridge, and the upper end of the latter adapted to receive a hair spring L.

When a spring or balance has been placed in position it is desired that the balance staff should be capable of instant vibration, and that when it has vibrated a predetermined number of times, it shall complete an electric circuit at the point from which it started. To effect this there is secured to said staff, above the plate B, a radial pin i', and within the plane of vibration of such pin are two flat springs N and N that are secured upon one end of a lever O which is pivoted near its opposite end and is adapted to be moved upon its pivot so as to cause said springs to be placed within the track of said pin, or to remove them from such track. Said springs are the terminals of an electric circuit and are arranged with their outer ends nearly parallel and separated by a distance less than the diameter of said pin so that when they are moved inward, the latter will pass between and engage with said springs, closing the circuit and arresting the motion of the balance staff.

The lever O is held normally in position to arrest motion of the balance staff I by means of a spring P that is arranged to engage with and press outward upon its rear end but is moved to the opposite limit of its motion by means of a shaft Q which is journaled vertically within the base section A and plate B and at its upper end is provided with a pawl q that when such shaft is rotated in one direction is adapted to engage with the rear end of said lever and move the same inward, while when said shaft is rotated in an opposite direction said pawl will trip over said lever end. Said shaft is held at the rearward limit of its rotary motion by means of a radially arranged spring q', and is moved in an opposite direction by an armature q^2 which is secured radially upon the shaft and is acted upon by two electro-magnets R and R that are suitably arranged with reference thereto. When the lever O has been moved to position to release the balance staff, it is locked in such position by means of a detent S that is pivoted upon a bridge T near the center or fourth arbor F and at one end is provided with a notch s which is adapted to engage with a pin o that projects upward from said lever. The shape of the notch is such as to cause the pin to automatically move said detent into position for engagement as said lever is turned to release the balance staff. At the completion of the predetermined number of vibrations of the balance staff the detent S is released from engagement with the pin o and the lever O automatically returns to its normal position and thus causes the springs N and N to engage with the pin i and arrest the motion of said staff. Such release is effected by means of a plate U which is secured upon and rotates with the fourth arbor F and is provided with a pin u, that, at the desired instant, engages with a similar pin s' upon said detent and moves the latter in the direction necessary for disengagement from said pin o. At the instant when the lever O returns to its normal position a shoulder u' upon the plate U engages with a lug o^2 upon said lever and operates to arrest the motion of the time train and to thus relieve the balance staff from all injurious shock or strain. In order that the engagement between said plate and lever may be effected at the precise instant desired, a cylindrical plate V is fastened upon the arbor F upon which said plate U is fitted so as to embrace about three fourths of its periphery, and be held thereon by friction. One side of the plate U is made open as shown, and is provided with two arms u^2 and u^3 between which is placed a screw W that has its ends in engagement with the contiguous faces of said ends and its threaded body contained within a threaded lug v which is formed upon and extends radially from said plate V. As thus arranged, by turning said screw it will be moved lengthwise through said boss and cause said plate U to be turned upon said plate V so as to change the position of the shoulder u' with relation to the arbor F.

The springs N and N, not only act as stops to arrest the motion of the balance arbor, but also as circuit closers, for which purpose the lower spring is insulated from the other and connected electrically with an insulated binding post X by a wire x, while the upper spring is secured directly upon the lever O and through the same and the casing, or by any usual means, is in connection with a second binding post X'. As thus arranged it will be seen that when the pin i passes between the ends of said springs an electric connection is instantly produced.

The registering mechanism is inclosed within a casing Y which has the form shown in Figs. 14, 15 and 16 and is supported and secured upon a hollow base Z that in turn rests upon and is attached to a bench or other suitable support. Within said casing is journaled a vertical, hollow arbor A^2, which upon its upper end carries a hand a that by the rotation of said arbor will be caused to move over a circular dial B' which is secured upon the upper side of the casing and is provided with fifty equal divisions b, b, &c. Within said hollow arbor is journaled an arbor C' which extends downward into the hollow base Z and upon its upper end has secured a hand c' that is longer than said hand a and when said arbor is rotated travels over a second series of divisions b', b', &c., numbered from 1 to 100 which are provided upon said dial.

Journaled at one side of and parallel with the arbors A^2 and C' is an arbor D' that carries a toothed wheel d and a pinion d', the first of which parts meshes with and receives motion from a pinion c^2 that is secured upon said arbor C' while said pinion d' meshes with and imparts motion to a toothed wheel a' which is carried by said arbor A^2, the relative dimensions of said pinions and wheels being such as to cause the shorter hand a to move forward one degree for each complete rotation of the longer hand c'. The engagement between the pinion c^2 and the arbor C' and the wheel a' and the arbor A^2 is produced by friction so that each arbor is capable of being independently turned in order to set the hands at zero. This is effected by means of two heart-shaped cams a^2 and c^3 which are secured, respectively, upon said arbors A^2 and C' and are simultaneously acted upon by the arms e' and e' of a lever E' that is journaled within the casing and operated by means of a knob e^2 that projects through a slot y in the upper side of the casing Y.

The register mechanism is driven by any suitable motor through the arbor C' for which purpose there is secured to the lower projecting end of the latter a toothed wheel c^4 that is adapted to be engaged by an intermediate toothed wheel F' which is pivoted upon one end of a pivoted bar G' and is in constant engagement with a motor driven wheel H' the arrangement being such as to enable said wheels c^4 and F' to be engaged or disengaged by the movement of said bar upon its pivotal bearing. The bar G', is by means of a spring g' held normally in such position as to cause the wheels c^4 and F' to be disengaged and is moved in an opposite direction by means of an armature I' which is secured to an arm g^2 that extends laterally from said bar. Said armature is moved by means of an electro-magnet K' in the usual way, but for purposes hereinafter stated, each coil of such magnet is made double, so that when currents of electricity having equal strength are passing at the same time and in opposite directions through the wires they will neutralize each other and produce no magnetism, but if one current is interrupted, then the other current will act with full effect and the armature will be attracted.

It is necessary that the registering mechanism shall be locked from movement when not intentionally caused to operate, for which purpose there is employed a detent L' that is arranged to be moved vertically into and out of engagement with the teeth of the wheel c^3 of the arbor C' and by spring pressure, is held normally at the upper limit of its motion in engagement with said wheel. When the hands are being set at zero, said detent is moved out of engagement by means of an inclined portion of the arm e^2 of the cam lever E' which arm passes over the end of said detent and moves the same downward just before the impinging of the arm e' upon the cam c^3. As soon as said cam lever is released and returns to its normal position, said detent automatically engages with said wheel c^4. A laterally adjustable clamp l' engages with said detent and enables it to be moved so as to cause it to exactly coincide with the teeth of said wheel. To permit of the disengagement of said detent at the instant a connection is made between the motor and registering mechanism, it is secured upon and supported by the arm g^2 of the bar G' and with such arm is moved horizontally away from the wheel c^4 by the action of the electro-magnet upon the armature I'.

In order that it may be indicated which of the two currents sets the registering mechanism into operation,—there is pivoted at one end within one end of the casing Y, a bar M' which upon its opposite, free end carries a plate or dial m' that by movement of said lever upon its pivotal bearing may be caused to move horizontally to a limited distance beneath a glazed opening y' in the top of said casing. Upon such dial are the conventional signs for the terms plus and minus (+ and −) and by the movement of said bar to the limit of its motion in either direction, one or the other of said signs will be brought into sight.

Two electro-magnets N' and N^2 are provided to act upon the bar M', one of which magnets is placed upon each side thereof, near its pivoted end and opposite to an armature carried by it. Each of these coils forms part of one of the electric circuits of the magnet K' and it will be obvious that, whichever coil, (N' or N^2) receives the current first, it will be able to hold the bar M' in opposition to the magnetism induced by a current of the same strength in the other coil. The sign exposed on the plate m' will indicate, then, the circuit first closed. Another portion of the system is a polarized relay O' which has the usual construction and is connected electrically—through a standard clock P'—with a battery Q' so as to enable such clock to control and cause its armature o^3 to close or open either of two circuits and thus connect either of two sets of registers with another battery R'.

The mechanisms described may occupy any desired relative positions, but as shown in Fig. 1, the arrangement is preferably as follows, viz: Two or more vibrators for each set are arranged side by side upon a suitable support, and a like number of registers is located conveniently near, preferably upon the opposite side of a bench or table. Midway between said vibrators and registers is placed the polarized relay, a double switch S' having two levers s^2 and s^3 is placed in front of said relay, a circuit closer T' having two keys t' and t^2, is next in order and a switch U' having a single lever u' is placed in front of said circuit closer. The standard clock P' has a mercurial contact mechanism p' at the lower end of its pendulum which operates to connect electrically with a battery Q', the mag-

nets R and R that actuate the pawl shafts Q and Q of one set of vibrators, such connection being made through the switch S′ and circuit closer T′ as shown in Fig. 1, and for convenience being designated No. 1. From the switch a second circuit, No. 2, branches off from No. 1 and extends to each of the magnet coils of the relay O′, by which means a current from the battery Q′ may be caused to pass through either of said coils and thus move the armature to cause its contact piece o^4 to close a third circuit No. 3, which circuit No. 3, is formed by a wire that extends from the battery R′, to the relay O′ where it is connected with one of the fixed contacts o^5 and o^6 of said relay and with the contact o^4 of its armature, and from thence passes to and includes the magnet K′ of each register of the set and from thence through the switch U′ back again to said battery, while a fourth circuit No. 4 extends from the battery R′ through the switch U′ to the registers, then around the coils of each magnet, thence to each vibrator, and from thence back to said battery, the arrangement being such that each register is connected electrically with one vibrator of the set so that while the same circuit is employed for all of each set, the action of each is independent of the others. The operator now places balances or hair springs in position in one set of vibrators, and then manipulates the key t' of the circuit closer T′ which causes the next beat of the clock to send a current through the clock circuit No. 1 so as to release the time train of each vibrator and permit the same to instantly commence movement, after which, by means of the switch U′, the battery R′ is thrown into circuit upon the same side of the apparatus in readiness for use when needed. Just before the expiration of one minute the operator moves the lever s^3 of the switch S′ so as to connect the clock with the relay—by circuit No. 2—when the last beat of the minute from said clock sends a current from the battery Q′ through the magnet coils of said relay and closes the circuit No. 3 between the battery R′ and the registers upon that side through the contact o^5 of said relay.

If either of the balances, or hair springs being tested, is slow, the hands of the connected register will instantly commence to turn and will continue in motion until the balance has completed three hundred vibrations, when the contact springs N and N will be moved into engagement with the pin of the balance staff and closing circuit No. 4 between the vibrator and register will neutralize the current of circuit No. 3 upon the magnets of said register and operate to instantly arrest the motion of its hands. The position of said hands will indicate the number of seconds of variation of the balance, or spring in twenty four hours and the appearance of the —, or minus sign will show that said balance or spring is slow.

Should a balance or spring be fast the vibrator controlled circuit No. 4 will be closed at the expiration of the time required for the balance to make three hundred vibrations, and the hands of the register will be instantly started and continue to run until their motion is arrested by the clock circuit No. 3 at the expiration of one minute, when the +, or plus sign will be shown, and the position of said register hands will indicate the number of seconds which the balance or spring is fast in twenty four hours. If the balance or spring be perfect, then it will complete its three hundred vibrations exactly in a minute and accordingly the vibrator controlled circuit will be closed simultaneously with the clock-controlled circuit, and since the two currents flowing through the coils of the magnets K′ and K′ will neutralize each other, the register will not be set in motion.

The apparatus shown and described is not claimed herein, but is made the subject matter of a separate application filed by me of even date herewith and having Serial No. 438,778.

Having thus described my invention what I claim is:—

1. The method of testing balances and hair springs which consists in vibrating the same the number of times that a standard balance or spring would vibrate in a definite interval of time, in unison with a standard time piece and employing in connection therewith an indicating mechanism that is actuated only when the balance or spring varies from the standard, substantially as and for the purpose specified.

2. The method of testing balances and hair springs which consists in vibrating the same the number of times that a standard balance or spring would vibrate in a definite interval of time, in unison with a standard time piece and employing in connection therewith an indicating mechanism that is put in operation when the balance or spring is fast upon the completion of the number of vibrations, and is stopped at the expiration of the interval of time, substantially as and for the purpose set forth.

3. The method of testing balances and hair springs which consists in vibrating the same the number of times that a standard balance or spring would vibrate in a definite interval of time, in unison with a standard time piece, and employing in connection therewith an indicating mechanism that is put in operation when the balance or spring is slow upon the completion of the interval of time, and stopped when the number of vibrations has been made, substantially as and for the purpose shown.

4. The method of testing balances and hair springs which consists in vibrating the same the number of times that a standard balance or spring would vibrate in a definite interval

of time, in unison with a standard time piece, and employing in connection therewith an indicating mechanism which is actuated only when the balance is fast or slow, and whose action is commenced in the former instance upon the completion of the number of vibrations and stopped at the expiration of the interval of time, and in the latter instance, is commenced at the conclusion of the interval of time and stopped when the number of vibrations has been made, substantially as and for the purpose shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 23d day of May, 1892.

GEORGE E. HUNTER.

Witnesses:
GEO. S. PRINDLE,
W. H. CLOUDMAN.

(No Model.)

G. E. HUNTER.

MANUFACTURE OF TIMEPIECE BALANCES.

No. 490,204. Patented Jan. 17, 1893.

Fig. 1.

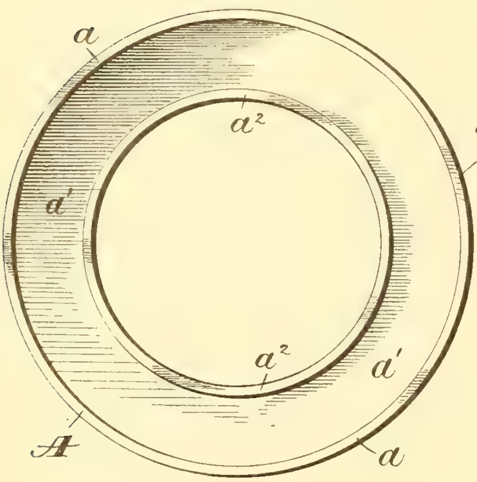


Fig. 2.

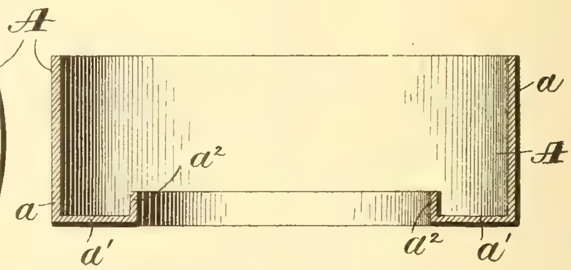


Fig. 3.

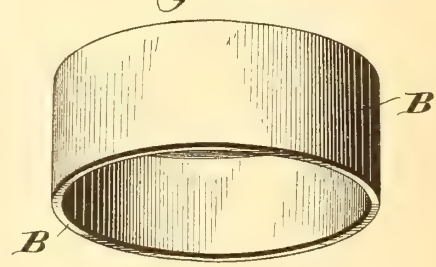


Fig. 4.

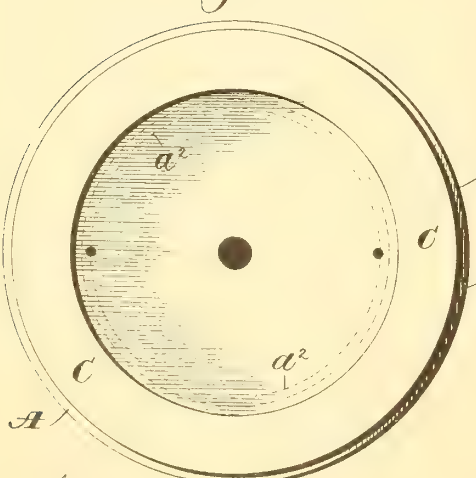
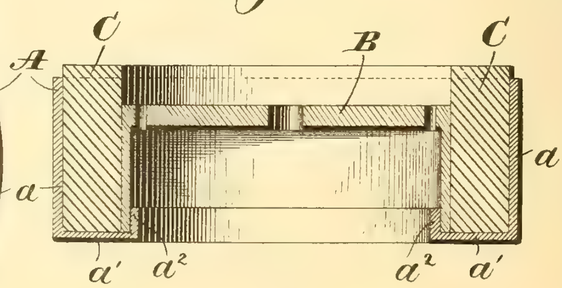


Fig. 5.



Witnesses:
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Henry C. Hazard

Inventor.
George E. Hunter, by
Prindle and Russell, his Attys

UNITED STATES PATENT OFFICE.

GEORGE E. HUNTER, OF ELGIN, ASSIGNOR TO THE ELGIN NATIONAL WATCH COMPANY, OF CHICAGO, ILLINOIS.

MANUFACTURE OF TIMEPIECE-BALANCES.

SPECIFICATION forming part of Letters Patent No. 490,204, dated January 17, 1893.

Application filed September 6, 1892. Serial No. 445,198. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. HUNTER, of Elgin, in the county of Kane, and in the State of Illinois, have invented certain new and useful Improvements in the Manufacture of Timepiece-Balances; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of the capsule used in my process; Fig. 2 a section taken diametrically through the same; Fig. 3 a perspective view of the steel cup employed; Fig. 4 a plan view of the cup, the brass ring and the capsule assembled, ready for the brazing operation; and Fig. 5 a section taken diametrically through said parts, thus arranged.

Letters of like name and kind refer to like parts in the several figures.

In my pending application, Serial No. 402,513, filed August 13, 1891, I describe a method of making bi-metallic balances which consists in making a cup shaped blank of steel, placing it and an encircling ring of brass in a brass capsule, and, then brazing said parts together. The rim of the steel cup furnishes the material to form the steel, annular member of the completed balance while its bottom provides the material to form the arm of the balance when finished, and the brass ring furnishes the material for the brass member of such balance. The brass capsule serves its usual function as a means to determine whether the steel has been subjected to an injurious degree of heat in the brazing operation. In practicing said method, it has been found, that in the brazing operation the edge of the rim of the steel cup is sprung inward so as to permanently lessen its diameter, and that the melted brass operates to float and displace the steel cup. These defects it is the object of the present invention to obviate, and to this end, said invention consists in the method and in the capsule, employed in making a bi-metallic balance, substantially as and for the purpose hereinafter specified.

In carrying my invention into practice I construct a capsule A, of brass, with an annular rim a, a bottom a' with a circular opening at its center, and an upwardly extending annular flange a^2 at the inner edge of the bottom. The space between the rim a and the flange a^2 is such only as to enable the rim of the steel cup B, and the brass ring C when around the latter to be placed therein, while the height of the flange a^2 is but one fourth that of the cup rim, and the rim of the capsule is higher than that of the cup. The steel cup B and the brass ring C are similar in every respect to the like parts in the application referred to, and their purposes have hereinbefore been mentioned. When they are to be brazed together, they are placed in the capsule with the cup in an inverted position so that its rim rests on the bottom of the capsule and encircles it, and is in engagement on its inner face with the upwardly extending flange a^2 of said capsule. Upon the melting of the brass ring in the brazing operation said flange by its engagement with the cup rim, supports the same and wholly prevents its inward compression, or the bodily displacement of the cup by its flotation by the melted brass. After the brazing operation, the blank thus obtained is subjected to the proper treatment to transform it into a complete or finished balance, but such treatment need not be set forth herein.

Having thus described my invention what I claim is—

1. The method employed in making bi-metallic balances which consists in placing a steel, cup-shaped blank and a brass ring encircling the same in a capsule, and with the rim of said blank supported internally, brazing said parts together, substantially as and for the purpose specified.

2. The method employed in making bi-metallic balances which consists in placing a steel, cup-shaped blank and a brass ring encircling the same in a capsule having a part to engage the blank rim on its inside, and then brazing said parts together, substantially as and for the purpose shown.

3. A capsule for use in the brazing to-

gether of the parts of a bi-metallic balance comprising an annular rim and a bottom having a part on its inner edge to enter within and support the rim of a steel cup-shaped blank, substantially as and for the purpose set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 25th day of August, 1892.

GEORGE E. HUNTER.

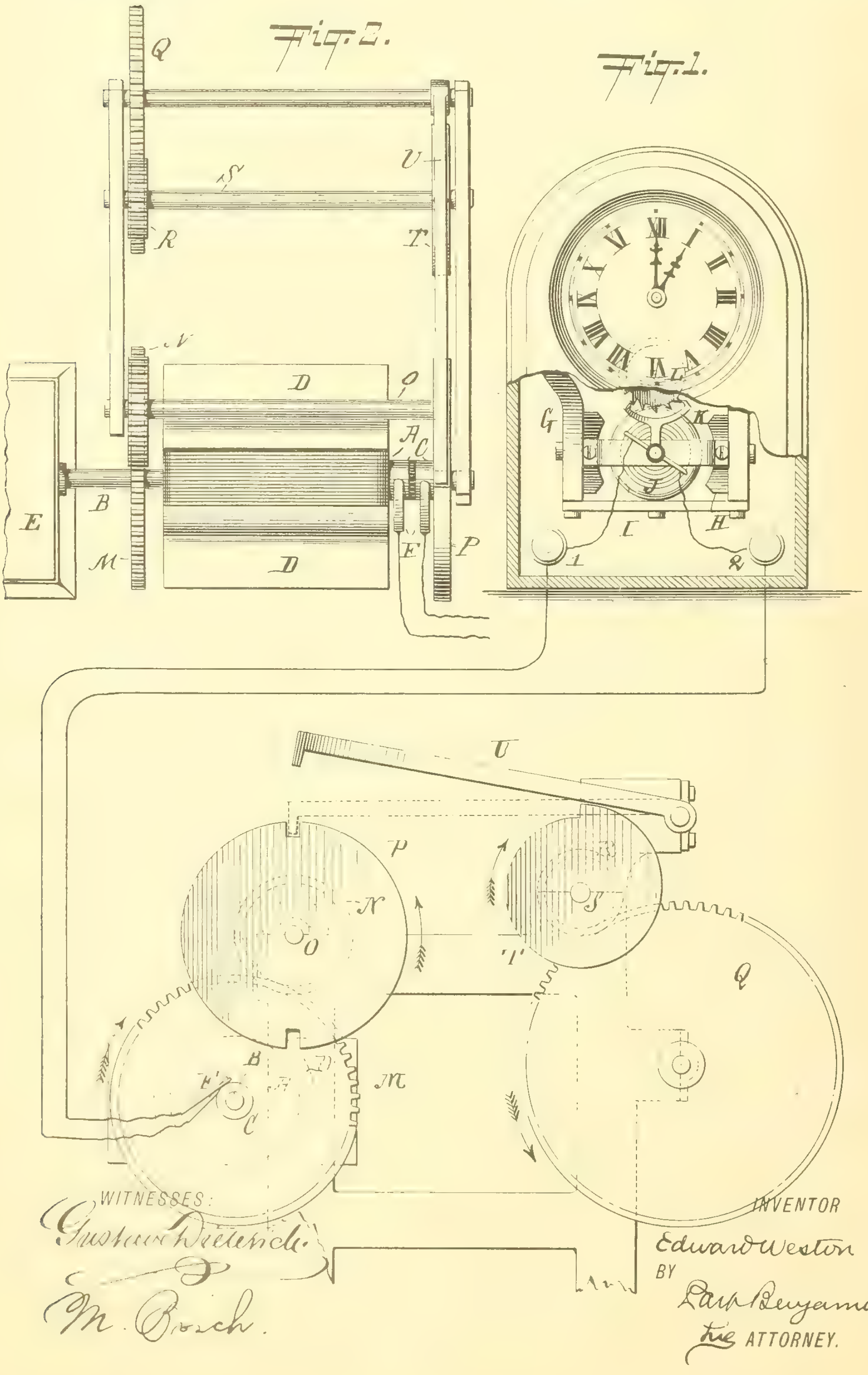
Witnesses:
GEO. S. PRINDLE,
JAMES BRADY.

(No Model.)

E. WESTON.

ELECTRICAL TIME INDICATING APPARATUS.

No. 490,698. Patented Jan. 31, 1893.



WITNESSES:

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M. Bosch.

INVENTOR

Edward Weston

BY

Park Benjamin

his ATTORNEY.

UNITED STATES PATENT OFFICE.

EDWARD WESTON, OF NEWARK, NEW JERSEY.

ELECTRICAL TIME-INDICATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 490,698, dated January 31, 1893.

Application filed June 16, 1891. Serial No. 396,435. (No model.)

To all whom it may concern:

Be it known that I, EDWARD WESTON, of Newark, Essex county, New Jersey, have invented a new and useful Improvement in Electrical Indicating Apparatus, of which the following is a specification.

In another application for Letters Patent dated June 4, 1891, Serial No. 395,132, I have described a combination which includes a means of producing a field of force, a loop conductor vibrating therein on the passage of a current through said conductor, and an indicating device actuated by said conductor, the aforesaid apparatus being organized and arranged for the transmission and distribution of time. In said application the means for producing electric impulses upon the circuit is represented symbolically.

My present application relates more particularly to a specific means for causing such impulses, the said means being itself a loop conductor moving in a field of force and connected in circuit with a second loop conductor also movable in a field of force, which second conductor being so actuated, controls the movement of the indicating mechanism. With said first conductor, I may combine a chronometric device so as to render its movement intermittent at definite predetermined intervals. or I may otherwise arrange or actuate said conductor to cause electric impulses at predetermined intervals to traverse the circuit.

In the accompanying drawings, Figure 1 is a front elevation of the apparatus showing an electric clock connected in circuit. Fig. 2 is a plan view of the said apparatus.

Similar letters and figures of reference indicate like parts.

A is an armature of a type commonly used in dynamos and motors, consisting of a central metal core upon which the coil is longitudinally wound. This armature is supported on a shaft B, which carries the insulated metal rings C, to which the coil terminals of the armature are connected. The armature is disposed in the field of the permanent magnets D, and is to be rotated by any suitable motor, indicated at E. In accordance with well-known electrical laws, when an armature disposed, as here shown, is rotated in the field of force of a magnet, the current in the armature coil will reverse at every half revolution; so that for each rotation of the armature caused by the motor E, a direct and reverse current will pass upon the circuit through the brushes F which bear upon the rings C.

The device so far described will be recognized as an alternating current dynamo of very simple type, and needs no further description.

Referring now to Fig. 1, at the upper part of said figure there is shown a clock or time mechanism, the details of which are fully described and claimed in my aforesaid pending application. This mechanism consists of a permanent magnet G having pole pieces H. Between the poles of the electro-magnet extends a brass bar I, which carries a cylinder of iron J. Surrounding this cylinder and supported on a shaft passing through said cylinder, is a coil of insulated wire, not shown, which coil is fast upon said shaft.

The construction and arrangement of the cylinder and coil are fully shown in Letters Patent No. 392,387, granted to me November 6, 1888. The said coil is, therefore, free to vibrate or oscillate in the annular field of force between the cylinder J and the pole pieces H. The circuit connections are such that when a current enters the apparatus at the binding post 1, it is conducted to said movable coil, and from said movable coil to the binding post 2. When a current, as described, passes into said coil, the said coil tends to turn on its axis over an angle depending upon the difference of potential between the terminals of the instrument. When a direct current enters the coil, it turns in one direction, and when a reverse current enters it, it turns in the other direction. Consequently, by sending an alternating current into said coil, it may be caused to vibrate or oscillate to and fro correspondingly to the alternations of the current.

Secured upon the coil shaft is an anchor K which engages with the pallets of an escapement wheel L, and this wheel in turn is geared with an ordinary time train, which actuates the hands of the clock shown. The movement of the hands of the clock may be adjusted relatively to any given number of vibrations of the movable coil; so that, for example, for each vibration of the coil, the min-

ute-hand may be advanced over a certain distance in arc on the face of the clock. It will be obvious that all that is necessary is to send impulses over the line at predetermined intervals to cause the clock hands to move correspondingly, and thus to indicate time when the electric impulses are controlled by a chronometric device.

In my simultaneously-pending application before named, I have illustrated, symbolically, a means of causing electrical impulses to traverse the line at certain intervals. As by the movement of a pendulum, closing contacts with a battery; and in said application, I have broadly claimed any means of producing a like result. In my present application, I describe a specific means for the same purpose; the object being to do away with metallic contacts and also with a battery. The energy of a battery is, of course, always variable, and it is necessary always to provide battery power sufficient for the pupose needed, despite any probable fluctuations. So also, the presence of contacts is objectionable owing to their difficulty in maintenance and liability to injury by the effects of the current passing through them. I therefore substitute in my present invention for the battery and the pendulum or other equivalent means described in my application aforesaid, the armature A, rotating, as described, between the magnet D and producing at the brushes F an alternating current. This current, obviously, if conducted to the mechanism already described, would cause an oscillation of the coil once for every half revolution of the armature; and this oscillation would continue for as long as the armature kept up its rotation, but it is desired that the impulse which actuates the clock mechanism should pass thereto only at certain predetermined intervals, which intervals are to be chronometrically regulated. For this purpose, I provide the simple apparatus which is illustrated in the lower portion of Fig. 1. On the armature shaft B is arranged a gear M, which engages with a pinion N upon the shaft O. The shaft O carries the notched wheel P; the notches of the said wheel being disposed diametrically opposite one another. The arrangement is to be such that for every half revolution of the armature, the notched wheel P is to make either a half revolution or some multiple thereof.

At Q is shown a gear which is driven by any chronometric device; as, for example, said wheel Q may be part of the train of an ordinary chronometer or clock, making one revolution for a minute, for example. This wheel Q gears with a pinion R which is on the shaft S; and on the said shaft there is carried a cam wheel T.

U is a pivoted dog which rests upon the periphery of the cam wheel T, and is lifted by the said cam wheel once during every revolution thereof. The bent-over extremity of the dog rests upon the periphery of the notched wheel P, and therefore readily falls into one of the notches on said wheel. When this occurs, the wheel P is prevented from moving; and thus the armature A is also prevented from rotating, and consequently no current passes to the clock. When, however, the cam wheel R lifts the dog U, then the wheel P is free to rotate, and hence the armature A is free to be driven by its motor, and as a consequence, an alternating current passes to the movable coil of the clock mechanism causing the same to vibrate until the dog U once more comes into engagement with a notch on the wheel P. It will readily be understood that if the wheel Q rotates once in a given time, the dog U will be lifted at regular intervals, and hence the armature A will be allowed to rotate at such intervals and the alternating current therefrom will operate the movable coil and clock mechanism for a definite period of time, thereby advancing the hands and causing said time period to be indicated on the dial.

It is distinctly to be understood that I do not limit myself to the specific releasing apparatus or to the specific arrangement of current-producing apparatus, or the combination of one with the other, as here shown. Neither do I limit myself, in anywise, to the specific proportions of gearing as indicated in the drawings. The arrangement of the armature A and of the gearing wheels M N P, on the one hand, and of the wheel Q with the pinion P and cam wheel T and pivoted dog U, on the other, is intended to be merely symbolical, and not to represent a working apparatus. Such an apparatus, however, from the description above given, can easily be proportioned, constructed and arranged by any electrical workman or clock-maker from his knowledge of the art. It is also to be understood that I may vary the current producing apparatus greatly from that which is shown here. Thus I may employ (*a*) a dynamo giving a continuous direct current, mechanically interrupted at predetermined intervals, (*b*) a dynamo giving an interrupted direct current, the speed of the dynamo being regulated to a given number of revolutions per minute, (*c*) a dynamo giving a continuous alternating current mechanically interrupted at predetermined intervals, (*d*) a dynamo giving an interrupted alternating current, the speed of the dynamo being regulated to a given number of revolutions per minute, (*e*) a dynamo giving a continuous alternating current, so constructed that the alternations occur at certain predetermined intervals.

Under the conditions noted in the above clauses (*a*) and (*b*), the direct current moving the distant coil in one direction only, means, such as a retracting spring acting upon said coil, are to be provided for moving said coil in the opposite direction.

I claim:—

1. Two loop conductors connected in circuit and movable in fields of force, and in combination with one of said conductors, a

means of operating the same and thereby causing a series of electric impulses to traverse the second conductor at predetermined intervals, and in combination with said second conductor, an indicating device for showing the movement thereof.

2. Two loop conductors connected in circuit, and pivoted in fields of force, and in combination with one of said conductors a means of vibrating, oscillating or rotating the same at predetermined intervals and thereby causing a series of electric impulses to traverse the second conductor, and a time indicating device controlled by the movement of said second conductor.

3. Two loop conductors connected in circuit and pivoted in fields of force, and in combination with one of said conductors and actuating the same a motor and a means of arresting the movement of said motor at predetermined intervals, and in combination with the other conductor and controlled by the movement thereof, a time indicating mechanism.

4. Two loop conductors connected in circuit and pivoted in fields of force, and in combination with one of said conductors and actuating the same a motor and a means of arresting the movement of said conductor at predetermined intervals, and in combination with the other conductor and controlled by the movement thereof a time indicating mechanism.

5. The combination of a dynamo electric machine, a means of actuating the same at predetermined intervals, a loop conductor vibrating or oscillating in the field of force and in circuit with said dynamo, and a time train controlled by said loop conductor.

6. The combination of a dynamo electric machine, a means of actuating the same at predetermined intervals, a loop conductor vibrating or oscillating in the field of force and in circuit with said dynamo, and a time train controlled by the said loop conductor.

7. The combination of an alternating current dynamo electric machine, a means of actuating or arresting the same at predetermined intervals, a loop conductor vibrating or oscillating in the field of force and in circuit with said dynamo, and a time train controlled by said loop conductor.

8. Transmitting time electrically by causing a loop conductor moving in a field of force to produce electric impulses of definite duration and frequency in a circuit including a second coil located in a field of force at a distant station and thereby, through the movement of said coil, controlling at said station a time indicating mechanism.

9. Transmitting time electrically by intermittently actuating at definite chronometric intervals a loop conductor in a field of force, and thus causing electric impulses of definite duration and frequency to be produced in a circuit including a second coil located in a field of force at a distant station and thereby through the movement of said coil controlling at said station a time indicating mechanism.

10. Transmitting time electrically by intermittently at definite chronometric intervals arresting the movement of a loop conductor moving in a field of force and thus causing electric impulses of definite duration and frequency to be produced in a circuit including a second coil located in the field of force at a distant station and thereby, through the movement of said coil, controlling at said station a time indicating mechanism.

11. A coil rotary in a field of force, a motor actuating said coil, a stop or catch on the coil axis, a dog or latch engaging with said stop, a chronometric mechanism controlling said dog, and in circuit with said coil a second coil movable in a field of force, and an indicating device for showing the movement of said second coil; the said dog being controlled by said chronometric mechanism to engage with said stop and so to arrest the movement of said coil at definite time intervals, thereby interrupting the generation of the current in a circuit and producing a series of electric impulses which actuate said second coil and cause said intervals to be shown by said indicating device.

12. The combination of a dynamo, a motor driving the same, a notched wheel or disk on the armature shaft of the dynamo, a dog engaging with said notched disk, a chronometric mechanism controlling said dog to cause said engagement at definite time intervals, and in circuit with said dynamo a coil rotary, vibrating or oscillating in a field of force, and a time train controlled by the movement of said coil.

EDWARD WESTON.

Witnesses:

R. C. FESSENDEN,

A. F. CONERY, Jr.

(No Model.)

E. KUHN.

CLOCK ATTACHING DEVICE FOR CYCLES.

No. 490,750. Patented Jan. 31, 1893.

Fig. 1.

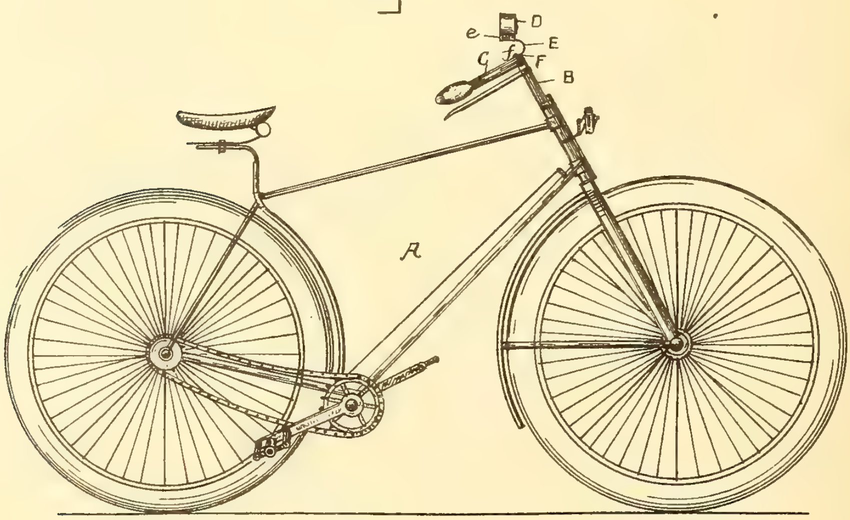


Fig. II.

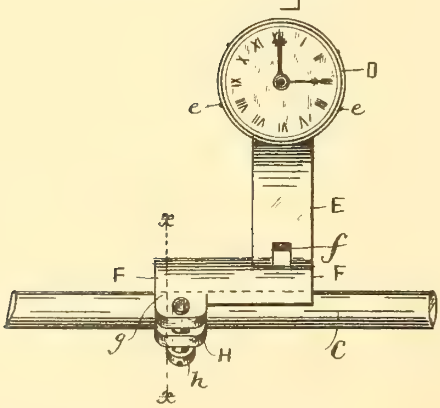
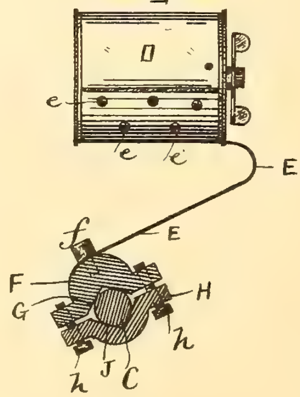


Fig. III.



WITNESSES:
Franklin Barritt.
H. V. Boswell.

INVENTOR:—
Edmond Kuhn.
BY
James H. Lancaster.
ATTORNEY.

UNITED STATES PATENT OFFICE.

EDMOND KUHN, OF BROOKLYN, NEW YORK.

CLOCK-ATTACHING DEVICE FOR CYCLES.

SPECIFICATION forming part of Letters Patent No. 490,750, dated January 31, 1893.

Application filed March 3, 1892. Serial No. 423,577. (No model.)

To all whom it may concern:

Be it known that I, EDMOND KUHN, a citizen of the United States of America, and a resident of Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Cycles, of which the following is a full, clear, and exact specification.

The object of my invention is to provide cycles, bicycles, tricycles and other velocipedes with a clock or time piece; and another object is to secure this clock or time piece to the central portion of the handle, directly over the steering bar, or to some other suitable part of the bicycle, &c., so that the clock may not be affected by the vibration or jarring movement of the machine while in use.

My invention consists in the use or combination of an ordinary clock of any suitable style or shape, with the necessary attachments, to a cycle or velocipede.

It also consists in securing this clock to one end of an elliptical, flat or other spring, which is preferably fastened at the other extremity to a clamping plate provided with a V shaped groove or recess, against which is placed a corresponding V shaped cap held thereto by screws or bolts.

Referring to the drawings:—Figure I. is a side view of a bicycle showing the attachment of a clock or time piece thereto. Fig. II is an enlarged detached front view of the clock, showing it attached to the handle rod of a cycle. Fig. III is a side view of Fig. II on line x, x, showing the attachment in section.

Similar letters refer to similar parts throughout the several views.

Letter A, represents a safety bicycle.

B, represents the steering bar, and C, the handle rod.

D, represents a clock, which is here preferably made circular, but any other shape may be used. This clock is of ordinary construction; and is secured to the vibrating spring E, by screws e, e, or by any other suitable means. This spring is preferably made flat and bent as shown in Fig. 3, and is secured to the adjustable metallic clamping plate or block F, by bolts f. One end g, of this adjustable clamping plate or block is provided with a V shaped recess or slot G, and the said plate at this position is placed over the handle C, of the bicycle. (See Fig. 3.) This adjustable clamping plate or block is secured to the handle rod C, by means of the cap H, which is held thereto on the under side as shown by bolts or screws h. This clamping cap is also provided with a V shaped groove J. The object of these V shaped grooves or recesses G, and J, is to enable the clamping plate to fit any size handle rod or other part of the cycle. The advantage of this construction is that a cycle, bicycle, tricycle or other velocipede, and especially a safety bicycle, can be readily provided with a clock or time piece which can be easily seen by the rider, thereby relieving him of the necessity of removing his hand from the steering handle of the machine to draw his watch from his pocket. This act may cause an accident to the rider by losing his balance and falling from his machine.

The object of attaching the clock or time piece to the spring instead of direct to the handle rod is that it is not affected by the jarring motion of the machine while running. The said clock can by means of the adjustable V shaped clamping plate and curve of the spring be held in any desired inclined position so that the plain or illuminated dial may be conveniently seen by the rider.

What I claim is:—

The combination with the handle rod C, of the two-part clamp detachably secured thereto, the flat spring arm E having a portion lying flat on and held to the upper part of the said clamp and curved as shown and its other end curved and extended at right angles to the length of the arm to conform to the curvature of a clock and to partially embrace the same, and the clock under which the spring arm passes and to which it is secured, substantially as shown and described.

In testimony that I claim the foregoing I have hereunto set my hand this 29th day of February, 1892.

EDMOND KUHN.

Witnesses:

FRANKLIN BARRITT,

JAMES H. LANCASTER.

(No Model.)

E. B. WINGER.

ALARM CLOCK.

No. 491,328. Patented Feb. 7, 1893.

Fig. 1.

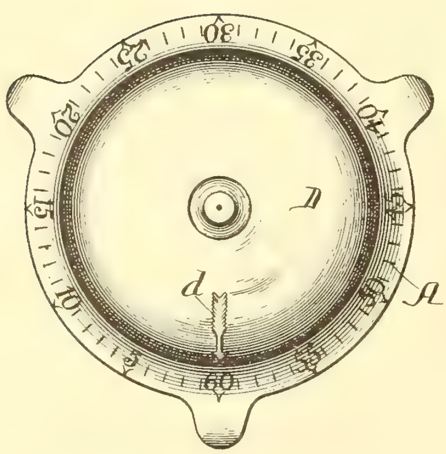


Fig. 2.

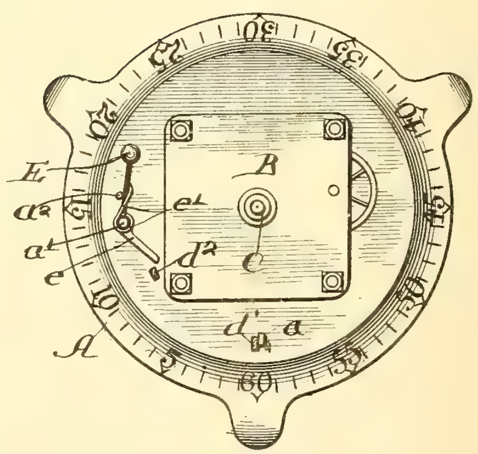


Fig. 3

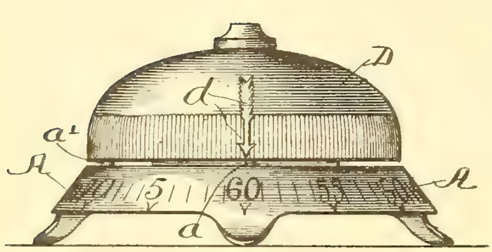
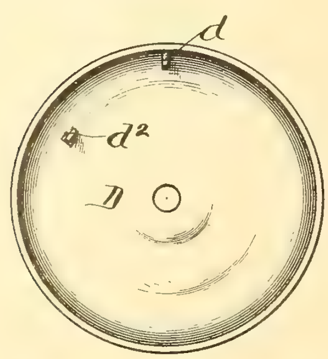


Fig. 4.



Witnesses:

Chas. G. Hervey

A. J. H. Ebbesen

Inventor:

Elam B. Winger,

by Wiles, Greene & Winter

Attys.

UNITED STATES PATENT OFFICE.

ELAM B. WINGER, OF CHICAGO, ILLINOIS.

ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 491,328, dated February 7, 1893.

Application filed June 3, 1892. Serial No. 435,350. (No model.)

To all whom it may concern:

Be it known that I, ELAM B. WINGER, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Alarm-Bells, of which the following is a specification.

My invention relates to certain improvements in an alarm bell, designed for use upon an office-desk, in a kitchen or in other similar places, where it is desirable to have an alarm, which can be set to sound at the end of a short interval. The purpose of the invention is to provide the simplest, cheapest and most compact device which will answer this purpose and be reliable in its operation.

My preferred construction is illustrated in the accompanying drawings, by means of four figures; of which,

Figure 1 is a plan view of my device in its preferred form; Fig. 2 is a plan of the base and operating mechanism disclosed by the removal of the bell; Fig. 3 is a side elevation; and Fig. 4 is an under view of the bell.

In general appearance it will be seen to resemble the ordinary call bell. The bell, however, is mounted upon a rotatable arbor carrying a main spring and geared to a suitable escapement, whereby the rotation of the arbor under the torsion of the spring is regulated. The base is lettered A, and bears about its beveled margin sixty spaces marked off by suitable characters and properly numbered. Upon this base is mounted the driving mechanism B, adapted to rotate the spindle C, and also to be wound up thereby. The bell D, is carried by this spindle and has a mark d, (shown as an arrow) upon its periphery. The spring is partially wound up, the bell secured to the central arbor and a stop d', provided thereon, adapted to engage with a lug a, upon the base to prevent the bell from being rotated back of the sixty or zero mark. When the bell is turned in the direction in which the numbers increase, it will, when released, return to its first position, and the movement is so timed that it will take it five minutes to return from the figure 5, ten from the figure 10, and so on. A hammer E, carried by a lever e, pivoted at a', to the base, is thrown toward the bell by means of a coiled spring e'. A stop a^2, prevents it from resting upon the bell, but is so located as to allow it to strike the latter by means of the elasticity of the arm which carries the hammer. The opposite arm of the lever is located where it will engage with a lug d^2, upon the bell just before the arrow upon the latter reaches the zero point, be crowded outward by said lug and released when said point is reached. This lug is hinged to the bell so that in winding up the latter, it may yield to pass over the end of the lever, but upon the return will bear forcibly against it.

It is obvious that various modifications of the different parts of the above invention are possible, and I hence do not wish to confine myself to the exact construction of any portion thereof.

I claim as new, and desire to secure by Letters Patent—

1. In an alarm bell, the combination with a suitable frame, bell and time mechanism, of a pointer connected with the winding arbor and rotated by the movement of the latter, a stop to prevent the pointer from passing the zero point of the dial, and a striking device actuated by the return of the pointer to the zero mark; substantially as described.

2. In an alarm bell, the combination with a suitable base, of a bell rotatably mounted thereon and provided with a time mechanism which is wound up by the turning of the bell in one direction, and which in unwinding rotates the bell in the opposite direction, a mark upon the bell, a stop to prevent said mark from passing the zero point, and a striking device actuated by the return of the bell to said zero point; substantially as described.

ELAM B. WINGER.

Witnesses:

H. BITNER,

CHAS. O. SHERVEY.

No Model.)

J. H. DYSON.

ELECTRIC CLOCK.

No. 491,339.

Patented Feb. 7, 1893.

Fig. 1.

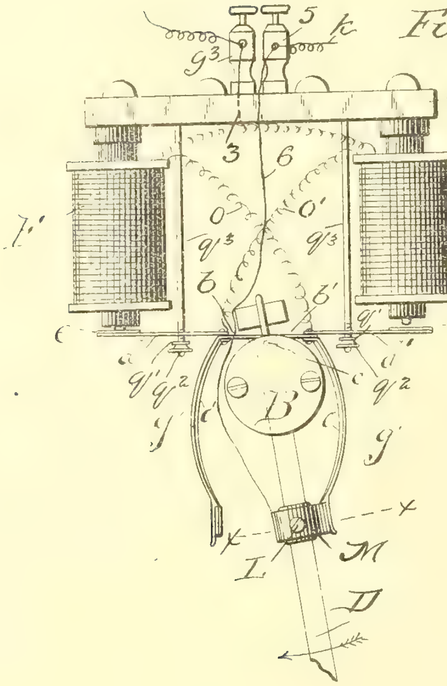


Fig. 4.

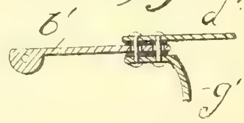


Fig. 2.

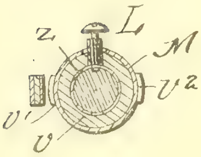
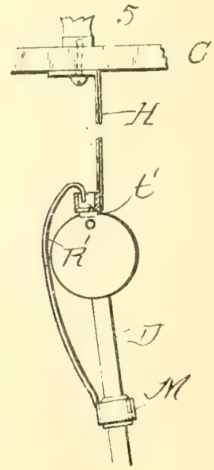


Fig. 3.



Attest

Wm T. Hall.

F. L. Middleton

Inventor

John H. Dyson

by Ellis Spear

Atty.

UNITED STATES PATENT OFFICE.

JOHN H. DYSON, OF BELLEVILLE, WISCONSIN.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 491,339, dated February 7, 1893.

Application filed June 6, 1892. Serial No. 435,603. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. DYSON, a citizen of the United States of America, residing at Belleville, in the county of Dane and State of Wisconsin, have invented certain new and useful Improvements in Electric Motors for Pendulum Clocks, of which the following is a specification.

My invention relates to electric clock motors and is an improvement upon the form of device shown in Letters Patent of the United States No. 439,838, of November 4, 1890, granted to me. My object in the present invention is to generally simplify the construction dispensing with a number of the parts shown in said patent, and to render the operation of the device positive and certain.

In the accompanying drawings, Figure 1, is a front view of my improvements. Fig. 2, is a sectional view on line x—x of Fig. 1. Fig. 3, is a detail view of a modified form of the electrical connection. Fig. 4 a view of a detail.

The pendulum D, the perforated stud-bolt B, the magnets F, F′, the armatures e e', carried on the arms d d', which are pivoted at c in line with the axis of the pendulum, are all of substantially the same form as those in the patent referred to.

In the present case, I utilize the depending arms g g' for the purpose of making and breaking the circuit, said arms being electrically connected with the wires o o' which connect respectively to one of the terminals of the magnets F F′. The arms d d', are insulated from the parts b b' of the arms, which parts are pivoted at c, as before described. The other terminals of the magnets connect with a wire 3, leading to a binding post g^3, and from this binding post electrical connection is made to the magnet of the registering mechanism, the return wire k, connecting with the binding post 5, from which the circuit is continued by the wire 6, which may be insulated and connected electrically to the collar M, secured to the pendulum intermediate of the lower ends of the arms g g' by a set screw L, passing through a boss on an interior ring z on the pendulum D, suitable insulating material v, being interposed between the ring and the collar. The collar carries platinum contact strips v' v^2, arranged to contact with similar strips on the depending arms g g' of the pivoted armatures.

The magnets F F′ and the binding posts are carried by a plate C from which the rods q^3 depend, and pass through openings in the arms d d' of the armatures, the lower ends being threaded and provided with set nuts q' and jam nuts q^2, the movement of the arms with the armatures and depending arms g g' being thus limited to regulate the duration of the contact between said depending arms and the collar M. In the position shown the collar is in contact with the right hand depending arm, and the circuit is thus closed through said arm, the wire o, the left hand magnet F, the binding post g^3, the registering mechanism, the binding post 5, the wire 6, and the collar. The said magnet is thus energized, and the armature e is held up. As the pendulum swings in the direction of the arrow, the armature e', and the depending arm g' follow said movement, until the arm d' comes in contact with the stop nut q'. The arm g' will thus be arrested and the circuit broken between it and the collar M, thus cutting out the magnet F, and releasing its armature, which immediately falls and carries the arm g into contact with the ring M, which advances to meet it, and this action reverses the movement of the pendulum by reason of the weight of the armature and arm g, and in addition to this electrical contact is established between the said arm and the collar M, thus cutting in the right hand magnet F′, through its wire o' and the connections before described. The armature e' is immediately drawn up, retracting the arm g' to its outward limit, and the contact between the arm g and the collar M remains to keep the magnet F′ in circuit until the armature e is arrested by its stop nut q when the contact is broken, cutting out the magnet F′ and allowing the armature e' to fall, and throw the depending arm g' in contact with the collar M, thus reversing again the movement of the pendulum and cutting in the left hand magnet F with the result before described.

In Fig. 3, I show a modified form of connection between the binding post 5 on the supporting plate C, and the collar M of the pendulum, by which the use of the wire 6 is avoided, which as shown, is subjected to constant

bending during the oscillation of the pendulum. This connection in the modified form, consists of the rigid arm H connected mechanically with the plate C and electrically with the binding post 5. It has at its lower end a mercury cup t', this being located near the pivotal point of the pendulum. A rod R′ has its upper bent end immersed in the mercury, and its lower end connected with the collar M, from which it will be seen that the oscillation of the pendulum will not affect the electrical connection, as the upper end of the rod R′ is at the pivotal point of the pendulum. A similar form of mercury cup connection may be used between the wires o o' and the depending arms g g'. Instead of employing depending arms g g' as a part of the electrical connection, the wires o o' may be continued downward and connected to the platinum points suitably insulated and carried on the said arms. The collar M indicates any form of contact.

I claim as my invention:

1. In combination the pivoted pendulum, the magnets, F F′ the pivoted armatures of said magnets, the depending arms g g' connected with the said armatures and arranged to make and break the circuits substantially as described.

2. In combination, the pivoted pendulum, the magnet, F F′ the pivoted armatures of said magnets, the arms g g' carried thereby, the interposed contact collar M on the pendulum, the electrical circuits, including the magnets, the contact points on the depending arms, and the interposed collar, the said arms being arranged to make and break contact with said collar, substantially as described.

3. In combination the pivoted pendulum, the magnets, the armatures thereof, the depending arms carried by said armatures, the collar M on the pendulum and in the electrical circuit, said collar being adapted to contact with the contact points of the depending arms and the means for limiting the falling movements of said arms substantially as described.

4. In combination, the pivoted pendulum, the magnets, the armatures carrying the arms, g g', the contact collar M, interposed between the arms g g', the electrical connection, including the depending arm H, having the mercury cup K at or near the pivot of the pendulum, and the rod R′ connected with the collar, and having its upper end immersed in the said mercury cup, and the means for limiting the movement of the arms g g', substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. DYSON.

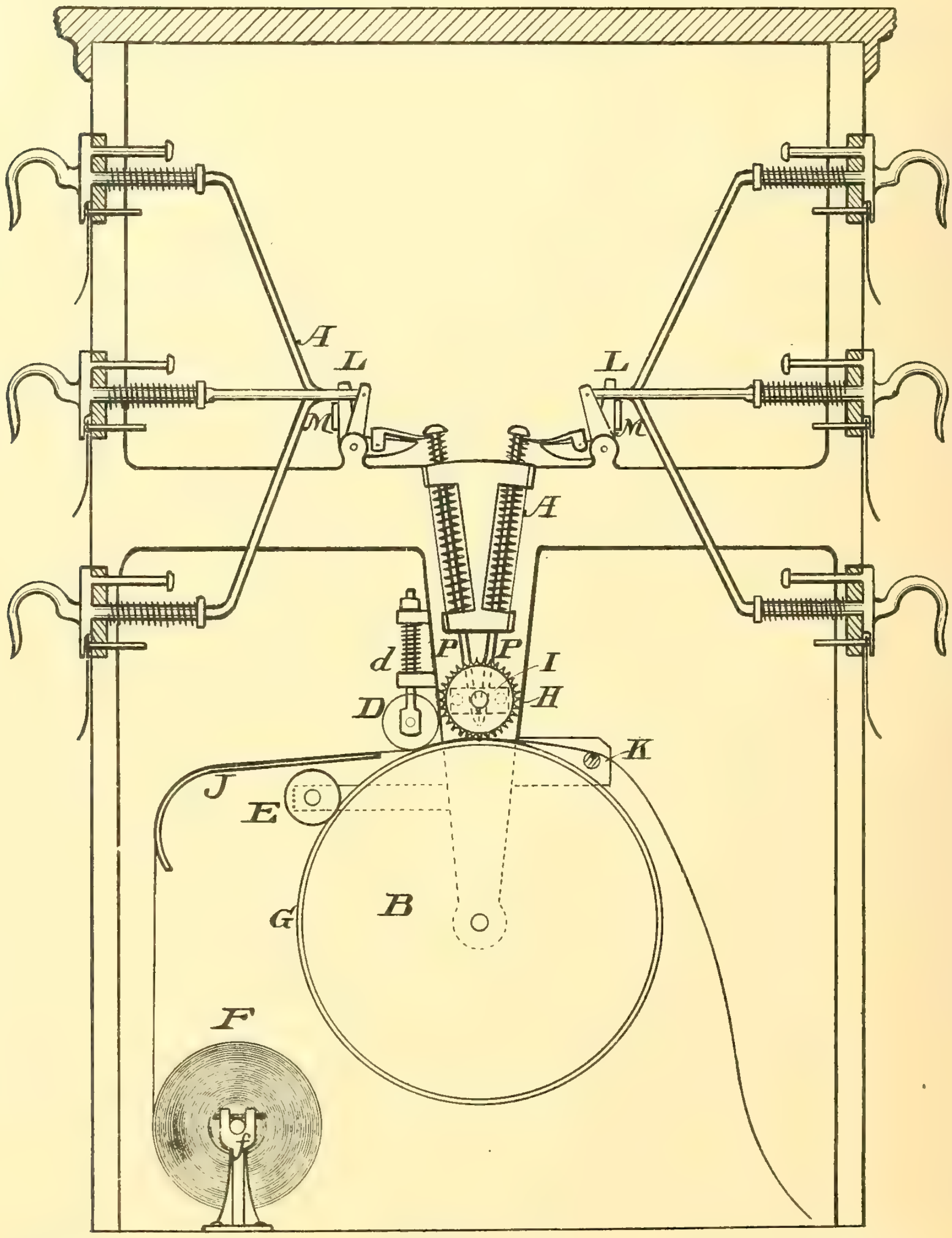
Witnesses:
MYRON ROSS,
SAMUEL TALMAGE.

(No Model.) 2 Sheets—Sheet 1.

G. W. HEENE.

WORKMAN'S TIME RECORDER

No. 491,557. Patented Feb. 14, 1893.



Witnesses

M. G. Norton

W. H. Merhead

Fig. 1.

Inventor;

George W. Heene,

by Geo. W. Tibbitts atty

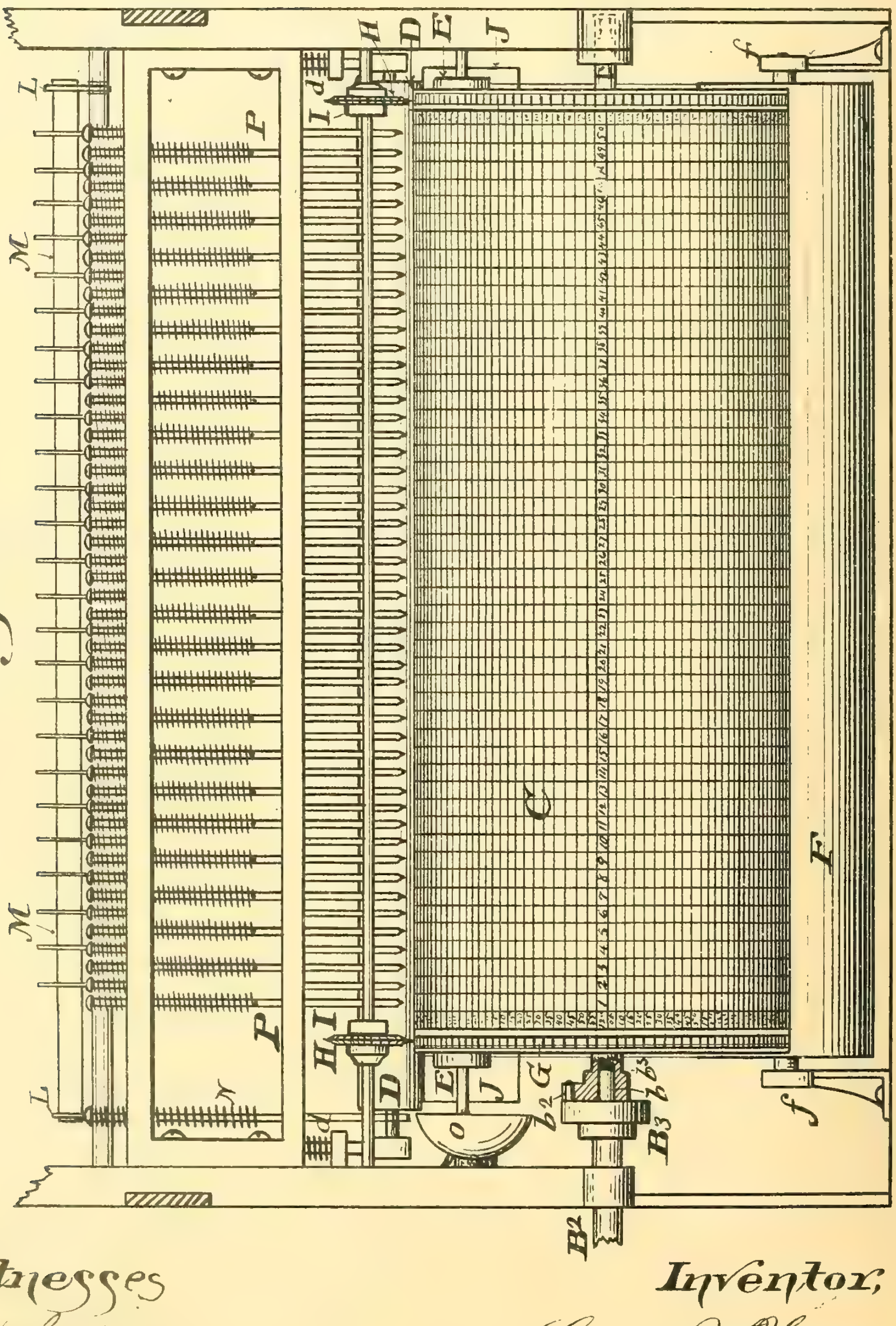
(No Model.) 2 Sheets—Sheet 2.

G. W. HEENE.

WORKMAN'S TIME RECORDER.

No. 491,557. Patented Feb. 14, 1893.

Fig. 2.



Witnesses

M. G. Norton

W H Newton

Inventor,

George W. Heene,

by Geo. W. Tibbitts Atty

UNITED STATES PATENT OFFICE.

GEORGE W. [illegible], OF CLEVELAND, OHIO.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 491,10[illegible], dated February [illegible], 1893.

Application filed [illegible], 1892. Serial No. [illegible]. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. [illegible], a citizen of the United States, residing at Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful improvements in Workmen's Time-Recorders, of which the following is a specification.

This invention relates to a device for self-recording the time of entry and departure of workmen or employés in factories, &c., and consists of additional improvements [illegible] patents Nos. 451,[illegible] and [illegible].

The invention consists of a mechanism constructed and arranged for printing and feeding a time chart in combination with a recording mechanism, said printing and feeding being performed by and in unison with a time clock, substantially as hereinafter described and pointed out in the claim.

In the accompanying drawings—Figure 1, Sheet 1, is a cross sectional view of the machine showing portions of the recording mechanism, and particularly the chart printing and conveying mechanism. Fig. 2, Sheet 2, is a longitudinal section of the same, showing the surface of the chart printing cylinder in its relation with the recording mechanism.

A A represent the recording mechanism contained in the aforesaid patents and are introduced here to show the co-operation of the same with my new mechanism, described as follows:

B is a cylinder or roller journaled in the framework of the main supporting frame, and is located directly under the punches P, its journals are removably set in its bearings, the journal at one end resting in a bearing against a spring yielding center point. The bearing at the other and operating end having a clutch for accurately adjusting the position of printing cylinder with the clock-work shaft B', consisting of a disk B', having a center pin b, and a guide pin b^2. On the end of the cylinder shaft is a head b^3, having a center hole to receive the center pin b, and a slot at one side to receive the guide pin b^2, this enables the printing cylinder to be quickly and accurately placed in proper position relative to the clock-work.

Upon the cylinder B is provided a chart printing plate C, from which the time chart is printed upon blank paper as it is fed or conveyed over said cylinder a little in advance of the recording punches, the purpose of which is to insure accuracy between the printing and the recording on the chart.

D is an impression roller fixed in spring bearings d d, which presses the paper upon the printing surface of the cylinder a little in advance of the punches.

E is an inking roller supported in suitable bearings for inking the printing surface of the cylinder.

F is a roll of blank paper supported in suitable bearings f f at one side of the printing cylinder, from which paper is drawn and conveyed to and over the said cylinder by means as follows: The ends of the cylinder B are provided with notched rims G G, and over said rims are provided toothed wheels H H, loosely set to turn on journals at the ends of a frame I, between the side bars of which the punches have their movements, the ends of said frame I being supported in the main framework and holding the said wheels H H directly of the center of the cylinder, the notches of which, aided by the said toothed wheels, accurately convey the paper, just printed under the punches.

J is a shelf over which the paper is carried and directed in a straight line to the printing surface of the cylinder.

K is a rod or bar supported just over the cylinder and over which the paper passes after the record has been made, the end hanging loosely. In the upper surface of the said rod or bar is made a longitudinal groove in connection with which a cutter or knife may be used for severing the paper having the printed record, at the close of a day or at such times as desired.

L L are levers fulcrumed on the same supports as the punch actuating levers are, and are joined by bars M M, which run along side of the said punch actuating levers, and are provided with pawls like said levers.

N N are punch pins just like the punches, but have blunt ends and are designed for [illegible] the purpose of which is to

provide for sounding the gong as a signal, at each and every pull of the punch actuating levers.

Having described my invention—I claim.

In a workman's time recorder a chart printing cylinder B rotated in unison with and by a clock, feed wheels H H journaled over and adapted to convey paper over said cylinder; a spring bearing impression roller D, an inking roller E in combination with punch mechanism substantially as described and for the purpose set forth.

GEORGE W. HEENE.

Witnesses:
GEO. W. TIBBITTS,
JAS. B. PASKINS.

(No Model.) 2 Sheets—Sheet 1.

E. KLAHN.

SELF WINDING ELECTRIC CLOCK.

No. 491,945. Patented Feb. 14, 1893.

Fig:1.

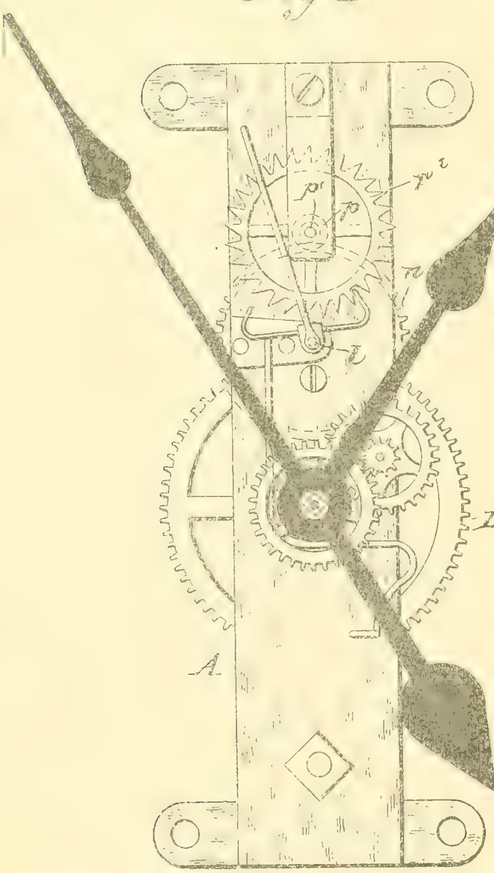


Fig:2.

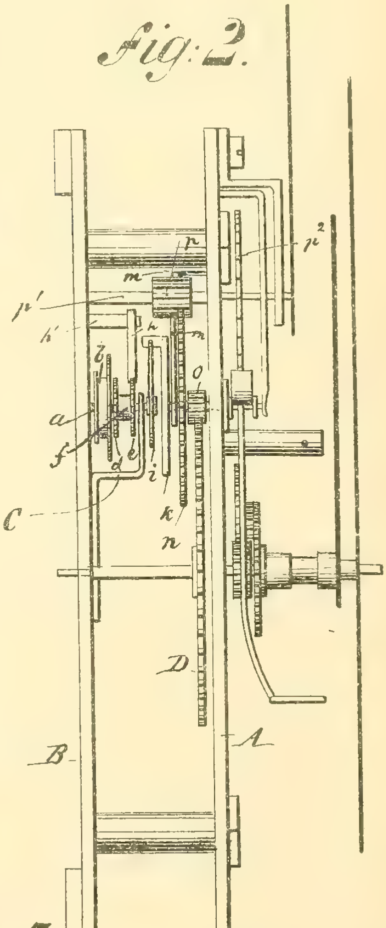


Fig:3.

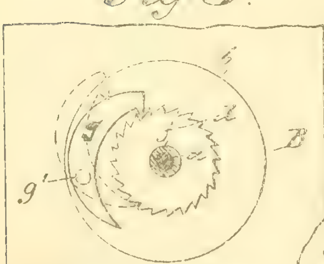


Fig:5.

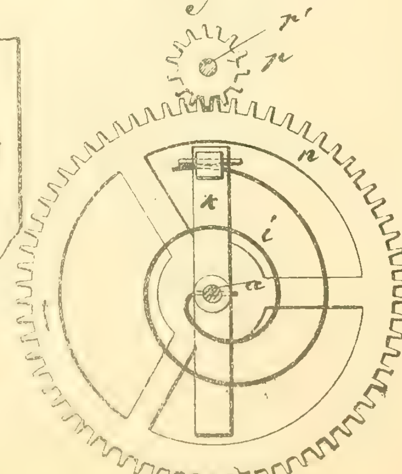
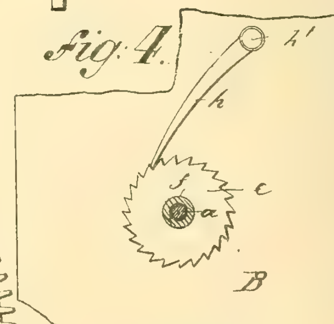


Fig:4.



WITNESSES:

INVENTOR

Emil Klahn

BY

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

E. KLAHN.

SELF WINDING ELECTRIC CLOCK.

No. 491,945. Patented Feb. 14, 1893.

Fig: 6.

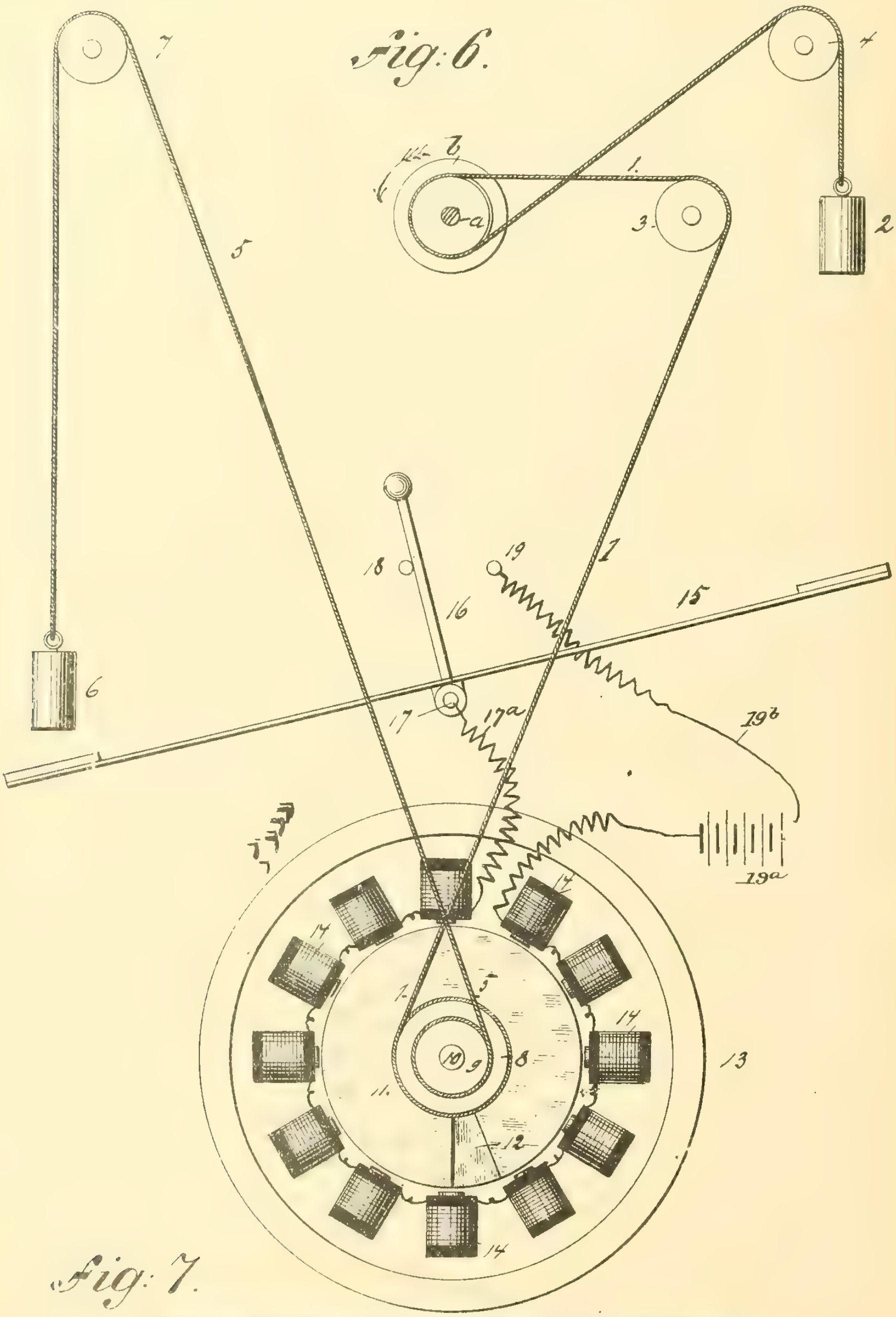
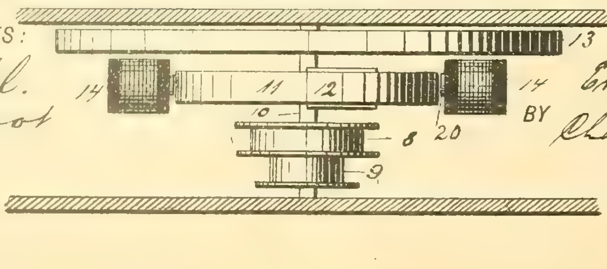


Fig: 7.



WITNESSES:

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E. Vandervoot

INVENTOR

Emil Klahn

BY

Charles Kah

ATTORNEY.

UNITED STATES PATENT OFFICE.

EMIL KLAHN, OF WEST HOBOKEN, NEW JERSEY, ASSIGNOR TO DANIEL C. HOOD, OF NEW YORK, N. Y.

SELF-WINDING ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 491,945, dated February 14, 1893.

Application filed February 17, 1892. Serial No. 421,891. (No model.)

To all whom it may concern:

Be it known that I, EMIL KLAHN, a citizen of the United States, and a resident of West Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Self-Winding Clocks, of which the following is a specification.

My invention relates to an improved self-winding clock, the object of the invention being to provide a novel form of winding apparatus which shall be operated upon the closure of an electric circuit and a further object is to provide a simple and efficient connecting device between the clock train and power roller, whereby all side pressure is avoided.

With these objects in view the invention consists in the detailed construction of the various parts and their novel combination or arrangement all of which will be fully described hereinafter and pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a front view of the clock mechanism. Fig. 2 is a side view of the same. Figs. 3 and 4 are detail views of the pawls and ratchets employed in the mechanism. Fig. 5 is a detail view of the connection between the power shaft and clock train. Fig. 6 is a face view of the winding mechanism, and Fig. 7 is a top-plan view of the motor or shaft.

In carrying out my invention I employ the front and rear plates A and B respectively between which is fitted the clock mechanism. This mechanism is divided preferably into the power mechanism in the back and the usual clock train in the front said parts being connected by a novel construction hereinafter explained. An arbor a is journaled between the rear plate B and a bridge piece C secured to rear plate, said arbor projecting through the bridge piece as clearly shown. A winding roller b is loosely mounted upon the arbor a adjacent to the rear plate, and between the said roller and bridge piece is rigidly mounted a sleeve f, carrying the ratchet wheels d and e. A crescent shaped pawl g (Fig. 3) is pivoted to the front face of the winding roll by a pivot g' and is formed with a nose on one end, while the other end is pointed in such a manner that the teeth of the ratchet wheel can be engaged by either end of the pawl; the second ratchet wheel e is engaged by the pawl h swinging on the pin h' secured to the rear plate. A coiled spring i (Fig. 5) is fastened at its inner end to the front of the arbor a, projecting through the bridge piece while its outer, forward, end is connected to one end of a lever k which is keyed on the arbor l, journaled in the front plate A and a bridge piece m, secured to the front plate. The arbor l has the gear wheel n and pinion o rigidly mounted thereon, said wheel and pinion forming parts of the clock train, and it will be observed that by connecting the power mechanism at the back, with the train mechanism at the front, by means of the coiled spring k instead of having a straight shaft, all side pressure is relieved, and the movements of the power and clock trains greatly facilitated. The gear wheel n meshes with a pinion p mounted on the arbor p' of the escapement wheel p^2, which latter drives the pendulum in the usual manner, by the common verge or fork as clearly shown in Figs. 1 and 2. The pinion o, meshes with the center wheel D, by means of which, motion is transmitted to the hand work in the ordinary manner as indicated by Figs. 1 and 2. The movement thus constructed will run down in a comparatively short time, say two hours and I therefore construct a special winding mechanism by which the movement will be automatically wound up as soon as the driving weight reaches its lowest point. This mechanism is shown in detail in Figs. 6 and 7 and consists of a cord 1 which carries the driving weight 2, at one end, while its other end is wound upon a roller, 8 mounted upon a shaft 10, journaled in the lower portion of the clock case. The cord 1 passes over the winding roller b and drives the same, said cord being also passed over idler rollers 3 and 4 to prevent contact with the movements and to throw the weight to one side of the case. A second weight 6, which acts as a counterbalance is attached to one end of a

cord 5, while the other end of said cord is wound upon a roller 9, which is also mounted upon the shaft 10. This shaft carries also a fly-wheel 13, and an insulator disk 11, having a single piece of soft iron 12, arranged in its periphery.

Around the disk 12, is arranged a series of electric magnets 14 which are fastened in the case in any suitable manner, and constitute, with the disk an electric motor, said magnets being connected with each other in the usual way, and with a battery by means hereinafter explained. A metal lever 15 is fulcrumed upon the pin 17, and is provided with a central upright metal arm 16 which is adapted to contact with the points 18 and 19, the latter point being connected with the battery 19^a by means of a wire 19^b. Each magnet is provided with the usual central core 20. The fulcrum 17 is electrically connected with the motor in any suitable manner by the wire 17^a so that when the lever 15 swings to bring the arm 16 in contact with the point 19 the circuit will be closed, revolving the disk 11 and shaft 12 and winding the cord 1 upon the roller 8 while the cord 5 is unwound from the roller 9. By this means the power is transmitted to the winding roller *b* and the mechanism automatically wound up.

In operation as the weight 2 descends by gravity the roller *b* will be turned as indicated by the arrow in Fig. 6 and at the same time the ratchet wheels *d* and *e* in consequence of the engagement of the pawl *g* with the wheel *d*. The spring *i* being secured to the end of arbor will be wound up as the arbor revolves, and the tension of the spring will cause the lever *k* to which it is fastened to revolve. This revolution of the lever *k* operates the arbor *l* and the pinions *o*, and *p* are accordingly revolved, which latter operates the pendulum, while the former operates the hand work. In this way the clock will run until the driving weight reaches the end of the lever 15. This weight then operates to reverse the position of said lever and by bringing the arm 16, in contact with the point 19, the electric circuit is closed, and the motor operated, winding up the weight 2, to its position and allowing the weight 6 to descend. The power of the spring *i* is not entirely exhausted so that the escapement is operated, during the operation of winding so that there is no stop or loss on account of the operation of winding. Immediately after the driving weight is wound up entirely the spring receives its lost tension again and is kept in this tension until the weight 2 is wound up again.

In order to render the winding up action noiseless and with the employment of the least power, I have constructed the pawl and ratchet wheel mechanism illustrated in Fig. 3. While the driving weight 2 is wound up the disk *b* with the pawl *g* turns from the left to the right hand side and as the end of the pawl with the nose is heavier than the pointed end of the same, the heavier end will drop from the teeth of the ratchet wheel, and the pointed end of the pawl engages at once the teeth of the said ratchet wheel so that the ratchet wheel is always kept in contact with the said pawl. At the moment the weight 2 is wound up the inner end of the spring *i* on the arbor *a* is kept in its position by the pawl *h* pressing on the ratchet wheel *e*, thus preventing the same and the arbor *a* from turning back. At the same time when the driving weights are almost wound up, the counter weight 6 will reach the corresponding end of the fulcrumed lever 15, thus causing the same to change its position and the arm 16 to leave the switch-pin 19. In this movement the electric current is broken. The swinging motion of the fly-wheel 13 on the shaft of the rollers 8 and 9 to which the cords of the weights are fastened, will not be stopped immediately with the breaking of the current, but will turn the said fly-wheel a few revolutions farther so that the counterweight is enabled to press the fulcrumed lever into its position as shown in the drawings. This automatic winding is repeated each time the weight 2 descends its full course, and as the battery is only used for a very short time at each operation, the clock can be run a very long time without attending to the batteries.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a self-winding clock the combination with a clock mechanism, of a winding roller connected therewith, the driving weight and cord, a counterbalancing weight and cord a shaft upon which said cords wind in opposite directions, an electric motor for revolving said shaft, and a vibrating lever carrying a contact arm adapted to make and break the current, to revolve or stop the shaft substantially as shown and described.

2. In a self-winding clock the combination of the winding roller carrying the driving weight by its cord, a secondary roller 7 carrying a counterweight in the same manner, rollers 8 and 9 to which the cords of the respective weights are fastened, a disk 11 of nonconducting material having a contact-piece 12 and rotating simultaneously with the said rollers 8 and 9, electro-magnets arranged around the said disk 11, and a switch arrangement by which the electric connection between the contact piece of the disk and the electro-magnets is established or broken, whereby the disk and the rollers 8 and 9 are rotated or stopped to wind the clock, substantially as set forth.

3. In a self-winding clock a driving weight and a counter-weight guided by their cords over corresponding rollers, in combination with a fulcrumed lever, having an upright

arm arranged in such a manner, that by the falling of the respective weights the lever is swung and the said upright arm comes in contact with or is removed from a switch-pin, whereby the electric circuit, to set the winding mechanism in operation, is established or broken, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 11th day of February, A. D. 1892.

EMIL KLAHN.

Witnesses:

CHARLES KARP,
ERNST ENCHELL.

(No Model.) 2 Sheets—Sheet 1.

J. W. NUNAMAKER.

ALARM FOR WATCHES.

No. 492,611. Patented Feb. 28, 1893.

Fig. 1.

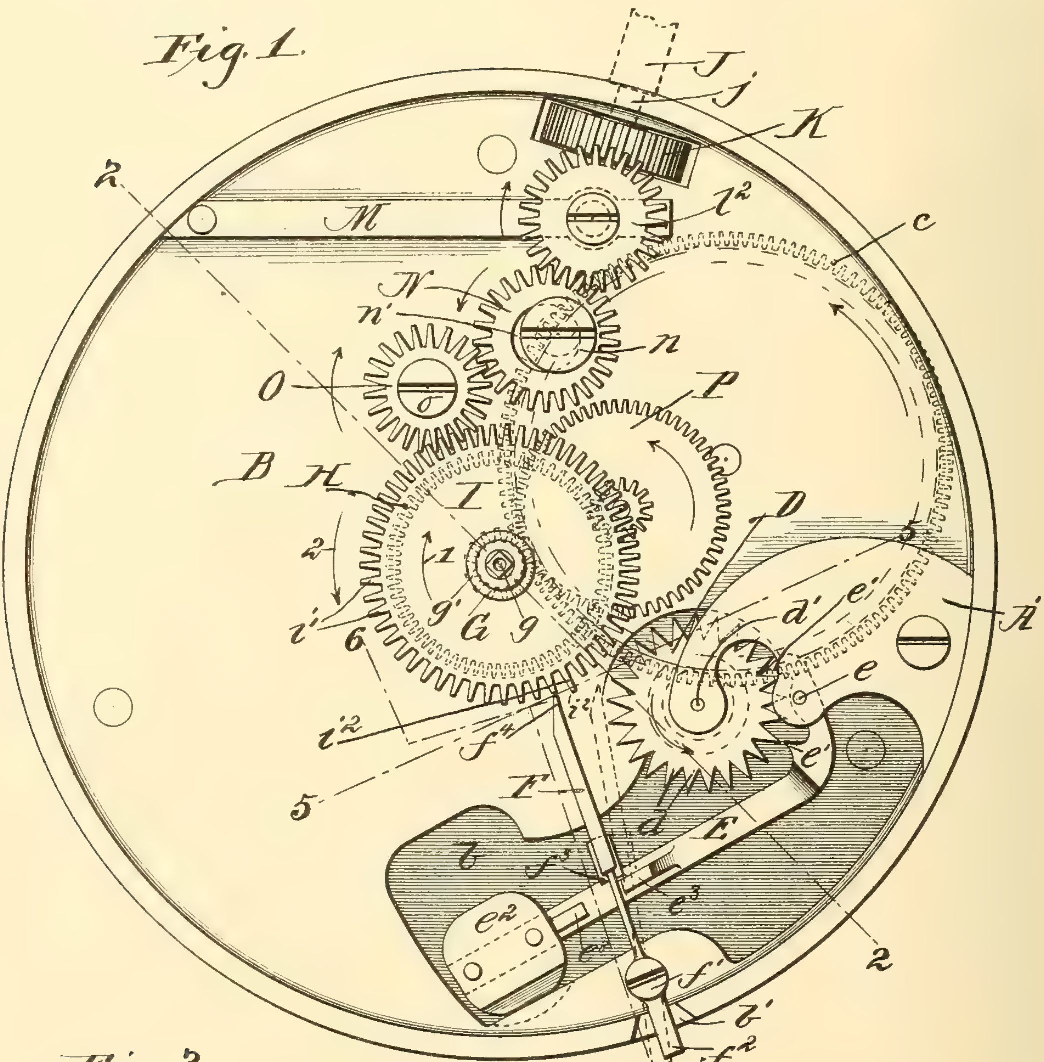
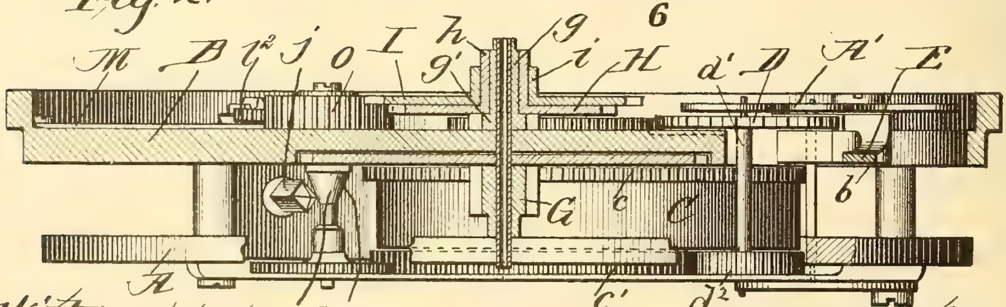


Fig. 2.



Witnesses
W. C. Corlies
Martin H. Olsen.

Inventor
John W. Nunamaker
By Coburn & Thacher
Attys

THE NORRIS PETERS CO., PHOTO-LITHO. WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. W. NUNAMAKER.

ALARM FOR WATCHES.

No. 492,611. Patented Feb. 28, 1893.

Fig. 3.

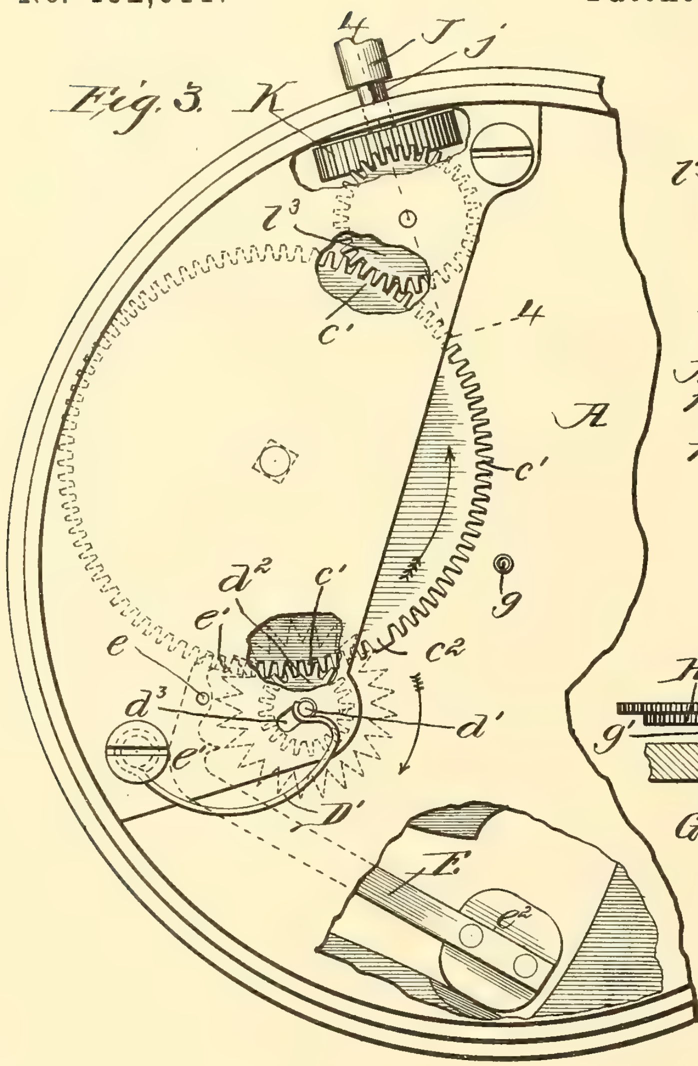


Fig. 4.

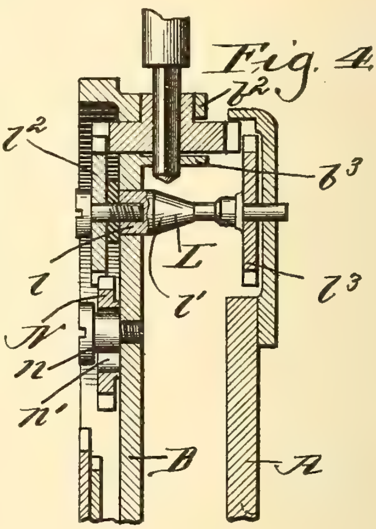


Fig. 5.

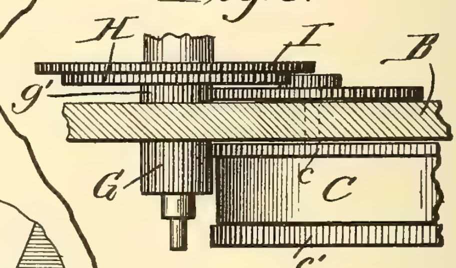


Fig. 6.

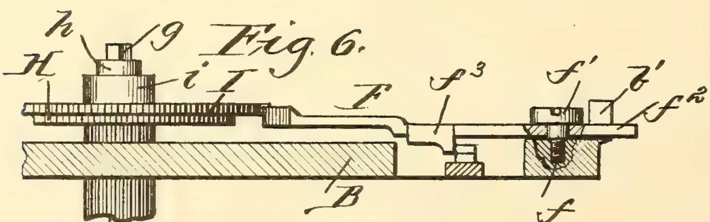
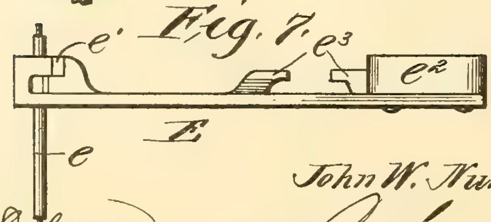


Fig. 7.



Witnesses
W. C. Corlies
Martin A. Olsen.

Inventor
John W. Nunamaker.
By Coburn & Thacher
Attys

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN W. NUNAMAKER, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FOURTH TO HARVEY L. HOPKINS, OF SAME PLACE.

ALARM FOR WATCHES.

SPECIFICATION forming part of Letters Patent No. 492,611, dated February 28, 1893.

Application filed January 26, 1892. Serial No. 419,282. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. NUNAMAKER, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Alarms for Watches, which are fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a plan view of the works of a watch embodying my invention looking down upon the front plate; Fig. 2, a cross-section of the same, taken on the line 2—2, of Fig. 1; Fig. 3, a detail bottom plan of the same, partly broken away; Fig. 4, a detail section, taken on the line 4—4, of Fig. 3; Fig. 5, a detail section, taken on the broken line 5—5, of Fig. 1; Fig. 6, a detail section, taken on the broken line 6—6, of Fig. 1; and Fig. 7, a side elevation of the alarm hammer lever, detached.

My invention relates to alarm mechanism for application to watches and consists in certain devices, for actuating the alarm by the main-spring, and setting, starting and throwing off the same as may be required.

I will now describe in detail the construction and operation of the mechanism of a watch in which I have practically embodied my invention in one way and will then point out more definitely in claims the particular improvements which I believe to be new and wish to secure by Letters Patent.

It is not necessary for the comprehension of my invention to show and describe all the parts and mechanism of a complete watch; hence I have shown in the drawings and shall describe only so much of a watch as will enable others to understand this invention.

In the drawings, A represents the ordinary back plate and, B, the like front plate of a watch movement. The drum or barrel, C, of the main-spring is also of any ordinary construction and is provided with the usual driving-gear, c, and the ratchet or winding-gear, c'. Just above the front plate and about midway between the center and outer edge of the latter, there is arranged on one side of the movement a toothed or escapement-wheel, D, which is provided with regular radial escapement-teeth, d, and is fixed upon the arbor, d', mounted in the back plate, and a bracket, A′, fastened to the upper side of the front plate. This arbor d' also carries at its lower end, a gear-pinion, d^2, and the arrangement of the arbor is such that the ratchet-gear, c' engages with this pinion. An alarm or hammer-lever, E, is fixed on an arbor, e, also mounted in the back plate and bracket A′. This lever E is substantially right angled, or of bell-crank form and the attachment to its arbor is made in the short arm thereof. This short arm of the lever is provided with pallets, e', and the arbor of the lever is mounted in position, so that the teeth of the escapement-wheel C will engage with one or the other of the said pallets according to the position of the lever. The pallets are raised somewhat above the plane of the lever and are arranged one at the outer extremity of the short arm thereof, and the other at the inner end of the same, or angle between the two arms.

The lever E is fixed on its arbor, so that its main body or long arm will be in the plane of the front plate and the latter is cut out at one side to provide an opening, b, within which the lever is arranged and which is sufficiently wide to permit its required vibrations. At the outer end of the long arm of the lever there is fixed a small hammer, e^2. Obviously when left free to the action of the main-spring the arbor of the escapement-wheel D will be constantly rotated, thereby rotating the escapement-wheel which will operate to vibrate the alarm lever and, the hammer on the outer end of the latter striking against the edges of the top plate in the opening in which it vibrates, will sound an alarm. This operation is obtained by the re-action of the main-spring upon the ratchet or winding-wheel c' and for this purpose the latter is left without the usual dog or pawl by which it is held from back movement when the main-spring is wound up. But, of course, there must be a stop of some kind to hold this wheel from such backward movement and this device I provide in the trip stop of the alarm itself, which I will now describe. A short stop-lever, F, is pivoted to the front plate near the outer edge thereof and extends thence inward over the alarm lever. The pivot-pin,

f, of this lever may be a small screw, f', so that this device can be removed at pleasure. The outer end, f^2, of the stop lever projects out beyond the pivot through a notch or slot, b', in the edge flange of the front plate beyond which it projects slightly, as seen in Fig. 1, so as to provide for moving the lever by hand from the outside of the plate. The alarm lever E is provided with two stop lugs, e^3, on the upper face of the long arm thereof. These stop lugs are set a little distance apart. The stop lever F passes over the open space between these two lugs on the alarm lever and at a point just inside of the latter is provided with a lug or shoulder, f^3, projecting downward and outward on each side of the lever, as seen in Fig. 1 of the drawings, and extending down far enough to engage with one or the other of the stop lugs, as seen in Figs. 1 and 6. The stop lever extends inward beyond this point to a wheel on the main arbor, which is provided with a tooth for tripping this lever at the required point, as will be presently described, this end, f^4, of the lever being, preferably, beveled, and this stop lever is, therefore, the trip lever for the alarm. Now when the stop lever is brought into engagement with one of the stop lugs on the alarm lever, as seen in Fig. 1, obviously the alarm lever cannot vibrate and, being thus held in a state of rest, it will act as a stop to the escapement-wheel and through the latter, also as a stop to the winding-gear c', thus taking the place and performing the office to this extent of the ratchet usually supplied for this latter gear.

In order to provide for the ordinary winding up of the main-spring without operating the alarm lever, the lower end of the arbor d' of the escapement-wheel is set in a slot, d^3, as seen in Fig. 3, and a spring, D′, is provided which normally holds the said arbor up to the inner end of said slot in position for the engagement of the pinion thereon with the winding-gear. The slot is inclined backward somewhat in the direction of the movement of the said gear in winding, so that when it is rotated for this purpose the lower end of the arbor will be moved outward in the slot, the spring yielding for this purpose, and so throw the pinion out of engagement with the gear. The spring D′ is fastened at one end to the back plate, while the other is left free, but is bent so as to engage with the end of the arbor, as seen in Fig. 3. The driving-gear c engages, as usual, with the main pinion, G, on the main arbor, g, and above the front plate is the pinion, g', sleeved on the upper end of this arbor and fixed thereto, which, through an ordinary train, drives the hour-hand wheel, H, which is loosely sleeved on the sleeve of the pinion g' by means of a tubular or sleeve-hub, h, as seen in Fig. 2.

Just above the hour-wheel is the alarm trip-gear, I, which is sleeved on the hub of the hour-wheel by means of a tubular hub or sleeve, i, the friction between the two being sufficient to move the trip wheel with the hour-wheel, the same as the latter is moved through its sleeve mounting. This trip wheel is provided with gear teeth, i', at its outer edge, one of which, i^2, is extended outward, so as to be somewhat longer than the others. The inner end of the trip lever F is in the plane of this trip-gear I and extends inward almost to the line of travel of the short teeth, so that, obviously it will stand in the path of the long tooth i^2. This is the normal position of these devices when the trip lever is just engaged with the inner stop lug on the alarm lever, as seen in Fig. 1. Now as in the ordinary operation of the movement the trip gear I is rotated in the direction of the arrow marked 1 in Fig. 1, it is evident that when the long tooth i^2 is brought into contact with the inner end of the trip lever it will vibrate the latter, so as to release it from engagement with the stop lug on the alarm lever, which, obviously, also releases the winding-gear and the movement of the latter, under the action of the main-spring, revolves the escapement-wheel and sets the alarm lever into vibration, as already explained.

Unless stopped by some device the alarm would run after being set in motion until the main-spring is run down. Of course this would not be desirable and hence I provide an automatic stop, as follows: The winding-gear c' is provided at a certain point with a dead space or blind tooth, c^2, which is formed by joining two or more of the regular gear-teeth, or in other words, omitting to cut two or more adjoining gear teeth. The winding-gear is mounted upon its shaft and the main spring is constructed in such relation thereto that when the main-spring is wound up this blind tooth stands just beyond the engagement of the gear-wheel with the escapement pinion in the direction in which the former is to move, as seen in Fig. 3. Now when the alarm is tripped and the winding-gear released, it is obvious that the latter can make only about a single revolution before it is stopped, for when the blind tooth c^2 is brought around to the point of engagement with the escapement pinion, it is evident that such engagement cannot take place, and so the further revolution of the winding-gear is prevented, which, of course, stops the alarm; the regular stop devices may be subsequently adjusted by the holder at pleasure; but the stop lever is elastic, so that on winding, as the first impulse will be to throw back the alarm lever, the stop arm will spring into place and engage with the stop lever without opening the case.

It is, of course, desirable not only to stop the alarm mechanism by the trip device, but also to provide for the adjustment of the latter, so that, in this position, it will be out of the path of the trip tooth and the alarm cannot, therefore, be set in motion, so long as the devices remain in this adjustment. This result is effected, as follows: The ordinary op-

erative position of the lever F, to work both as a stop and a trip lever, is shown in full lines in Fig. 1, but this lever may be vibrated to the right still farther, as seen in dotted lines in said figure, in which position it is out of the path of the trip-tooth i^2, but still in engagement with the hammer lever, so as to lock the latter out of operation; obviously in this position the watch will run indefinitely without operating the alarm. So too the stop lever may be swung over in the other direction to engage with the outer stop lug, as also seen in dotted lines in Fig. 1, in which position it locks the alarm mechanism, as already described, and at the same time is out of the path of the trip-tooth; either one of these adjustments may be the ordinary position of the stop lever, and whenever it is desired to set the alarm it will be necessary only to move the stop lever into its central position, as indicated by the full lines in Fig. 1.

I will now describe the means for setting the alarm which is effected through devices that are also employed in stem winding. The watch is provided with a usual pendant arbor, J, but the inner end of this arbor is cut down to form a kind of stem, j, which extends inward underneath the front plate. This stem is of angular form, preferably rectangular, as seen in Fig. 2, and has mounted loosely upon it, a pinion, K, which is provided with an extension hub, k, projecting outward and fitted in a pendant bearing, b^2, on the front plate, as seen in Fig. 4. This also makes the bearing for the pendant arbor, but the stem of the latter is free to move back and forth in its pinion and is sufficiently long to permit this sliding movement. A short depending lug, b^3, drops from the front plate just inside of the pinion and serves to keep the latter in place, being perforated with an opening sufficiently large to accommodate the angular stem and permit it to revolve freely therein. The inner end of the pendant arbor stem is beveled on all sides, as seen in Fig. 2; and just within the path of this sliding stem, there is mounted an upright arbor, L, the upper end, l, of which is somewhat enlarged and passes up through a bearing in the front plate in which it it is free to slide vertically. The lower end of the arbor is mounted in the back plate and is of sufficient length to permit this sliding movement. Immediately opposite the beveled end of the stem, the arbor is beveled downward, so as to present a conical section, l'. A gear-pinion, l^2, is mounted loosely on the upper end of the arbor L above the front plate and just below this pinion the inner end of a spring, M, is also secured to the same, the outer end of which is fastened to the edge of the front plate, as seen in Fig. 1, this spring acting normally to hold the arbor down in the position seen in Fig. 4. The arbor L is also provided with a second gear pinion, l^3, fastened to its lower end just above the back plate. When the arbor is in the position shown in Fig. 4, the teeth of the upper pinion l^2 are engaged by the teeth of the pinion K on the pendant arbor stem, but the distance between the gear pinions l^2, l^3 is such that the teeth of the latter are then down out of engagement with the said pinion K. Just within the upper pinion l^2 there is an idle pinion, N, which is mounted on the front plate by means of a stud journal-pin, n. The bearing aperture of this pinion is cut out, so as to form a central opening, n', considerably larger than the journal-pin, thus providing for lateral movement of the former upon the latter. A gear-pinion, O, is also mounted by a stud pin, o, on the upper side of the top plate and is arranged to engage with the alarm trip wheel I. The idler N is between the pinions l^2 and O, but its journal is not in line with the journals of these two, but stands somewhat inside thereof, as seen in Fig. 1. Now in its lower adjustment, as seen in Fig. 4, the pinion l^2 is always in engagement with the idler N and the latter being free to move laterally on its journal will be thrown to one side or the other by the action of the pinion l^2 according to the direction in which it is turned. When the pendant arbor is turned, so as to rotate the pinion l^2 in the direction indicated by the arrow in Fig. 1, the first effect will be to throw the idler N outward on its journal, which movement will bring it into engagement with the pinion O, if such engagement does not already exist. The further rotation of the pinion l^2 in this direction will obviously rotate the pinion O and through it the trip gear in the direction indicated by the arrow marked 2 in Fig. 1, whereby the latter may be adjusted to set the trip tooth i^2 in the required position to make contact with the trip lever at any desired point of time. If the pendant arbor is turned, so as to rotate the pinion l^2 in a direction opposite to that indicated by the arrow on Fig. 1, the effect will be to move the idler N out of engagement with the pinion O, so that its rotation in this direction will not disturb the alarm mechanism. This movement will, however, bring the idler N into engagement with one of the train-gear, P, by means of which the hands are set; but this hand-setting mechanism constitutes no part of my present invention, except in connection with the alarm mechanism. The lower pinion l^3 on the arbor L engages with the winding gear c', but as the pinion l^2 is loose on the arbor the rotation of the latter for setting purposes, as described above, does not affect the lower pinion which remains at rest.

When it is desired to wind the watch the pendant arbor is pushed in, thus bringing the beveled inner end against the cone section of the arbor, by which the latter will be lifted and thus raise the pinion l^2 out of engagement with the pinion K, when, obviously, the operation of winding may be performed. This feature of the mechanism, however, is not a part of my present invention, except in connection with the alarm setting devices.

It will be noticed that the device for chang-

ing the setting devices is within the movement plates and that the spring M will operate to return the vertically sliding arbor L to the position shown in Fig. 4 whenever released from the inward thrust of the pendant arbor.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The escapement wheel D, in combination with the winding-gear c', connected to one end of the main spring, the hammer lever E provided with pallets e', and the stop lever F arranged to engage with the hammer lever and thereby act as a stop to both the alarm and the winding-gear, substantially as described.

2. The escapement wheel D, in combination with the winding-gear c' engaging with the pinion on the arbor of the former, the vibrating alarm lever E provided with pallets e' adapted to engage with the teeth of the escapement, the stop lever F adapted to engage with the alarm lever, and the trip gear I mounted on the journal of the hour-wheel and provided with a long tooth i^2 adapted to engage with the said stop lever to trip the same, substantially as described.

3. The winding-gear c', in combination with the escapement wheel D arranged to be driven by said winding-gear, the pivoted alarm lever E, provided with pallets engaging with the said escapement wheel and with stop lugs e^3, the stop lever F provided with shoulder f^3 adapted to engage with one or the other of said stop lugs to hold the alarm and winding-gear in a state of rest, substantially as described.

4. The winding gear c', in combination with the escapement wheel D, the arbor d' of said escapement mounted at its lower end in a slot d^3 and provided with a pinion d^2 engaging with the winding-gear, and a spring D' adapted to hold the arbor up to cause said engagement, but yielding to permit disengagement when the winding-gear is rotated to wind up the main-spring, substantially as described.

5. The vibrating alarm lever E, in combination with the stop lever F arranged to engage the former and hold it at rest, the trip wheel I provided with gear-teeth i' and a long tooth i^2 adapted to engage the inner end of said stop lever, the pinion O arranged to engage with said trip wheel, the idle pinion N mounted on its journal by an enlarged opening to permit lateral movement thereon, the driving pinion l^2 engaging with said idler N, and the stem gear K engaging with said driving pinion, whereby, when turned in one direction, the idler is moved into engagement with the pinion O to set the trip gear and turned in the other direction, the idler is moved away from and out of engagement with said gear, substantially as described.

6. The escapement-wheel D, in combination with the alarm lever E provided with pallets engaging therewith, the winding-gear c' provided with a dead space or blind tooth c^2, and the pinion d^2 fixed on the arbor of the escapement-wheel and engaging with the said winding-gear, substantially as described.

JOHN W. NUNAMAKER.

Witnesses:
CARRIE FEIGEL,
A. M. BEST.

(No Model.)

2 Sheets—Sheet 1.

A. J. REAMS.

ELECTRIC PROGRAM CLOCK.

No. 492,971.

Patented Mar. 7, 1893.

Fig. 1.

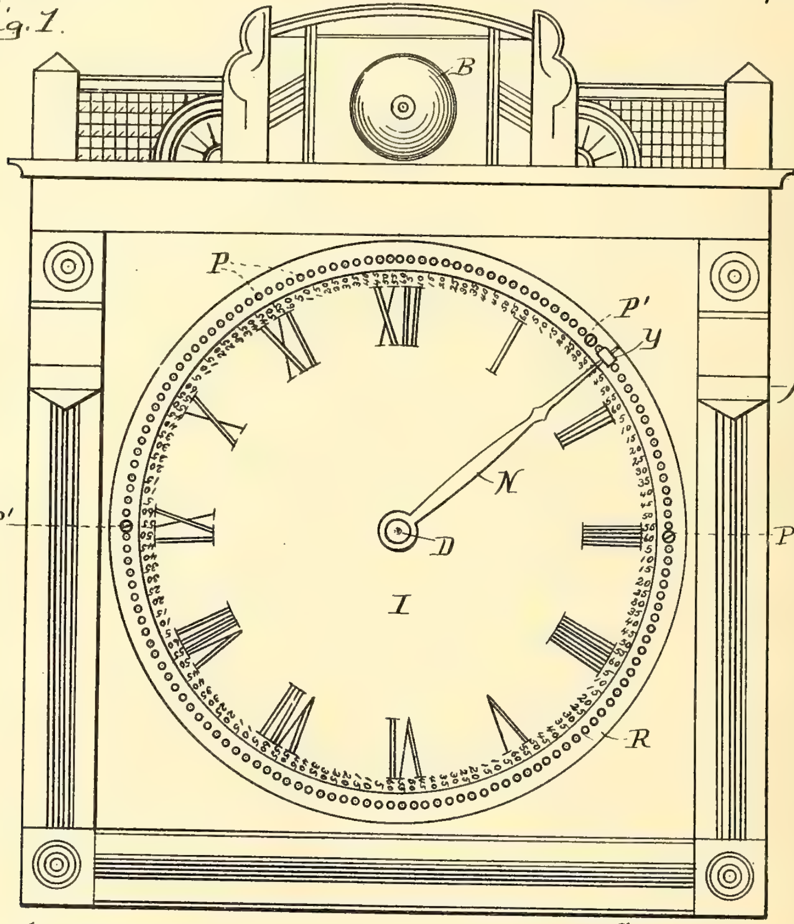
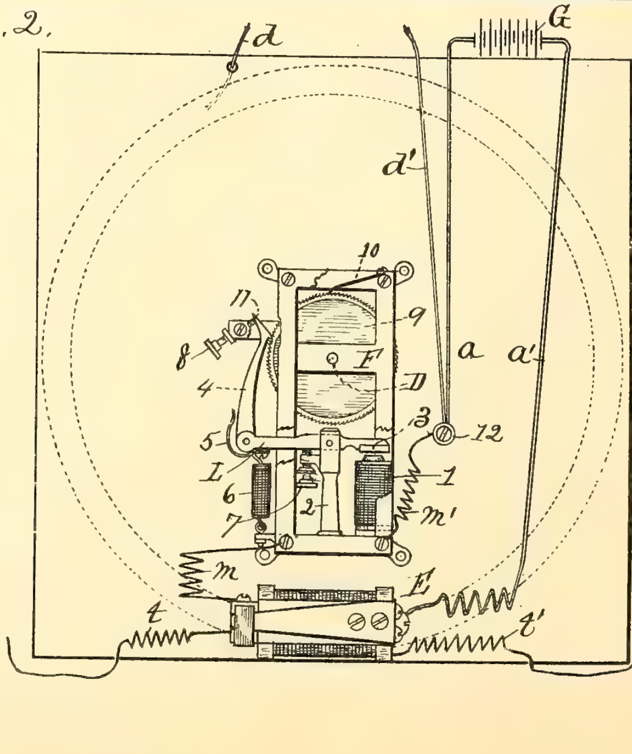


Fig. 2.



Witnesses.
W. B. Hagin.
F. A. Poore.

Inventor.
Andrew J. Reams
By
Wm. J. Hutchins
atty.

(No Model.)

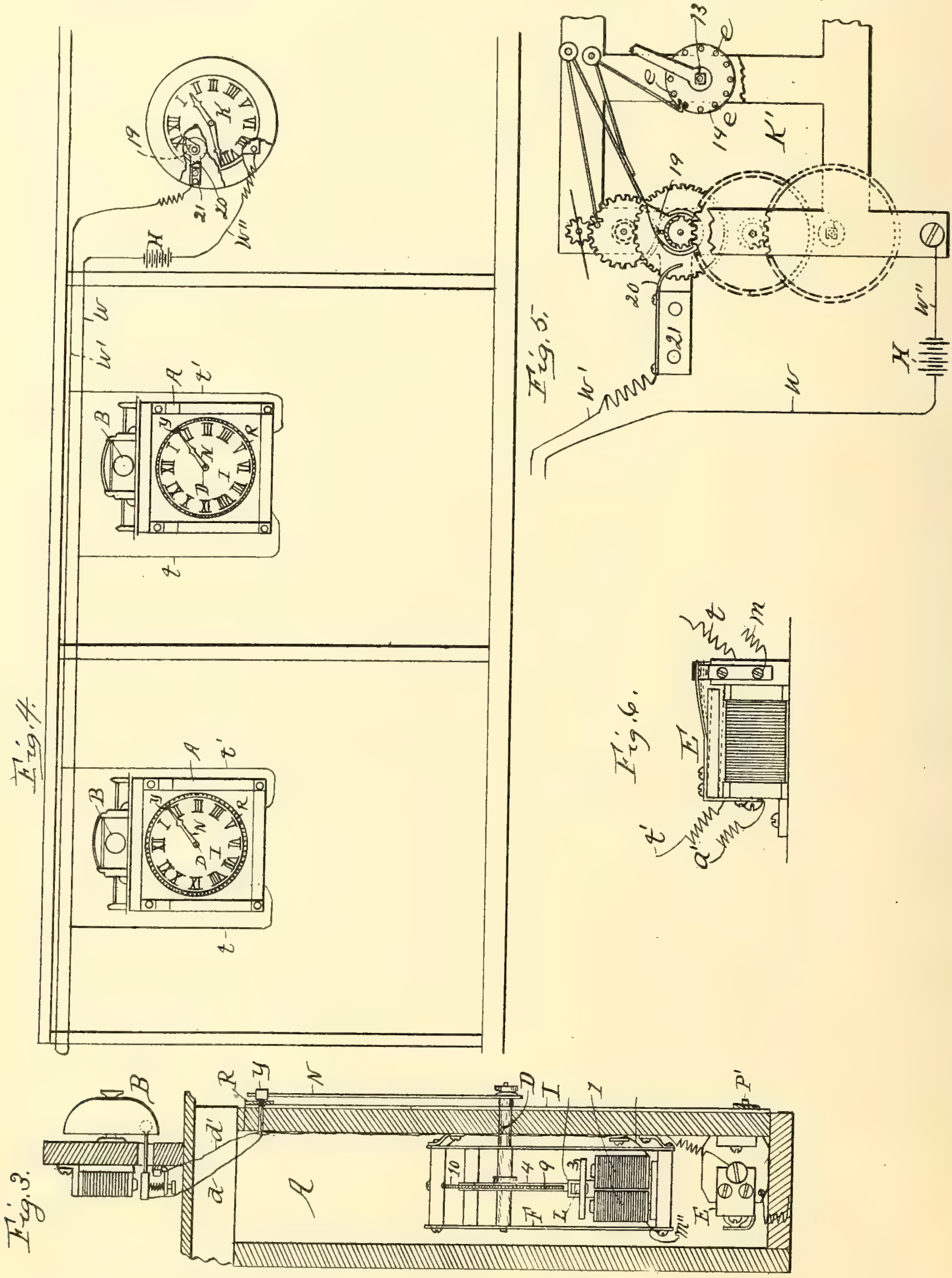
2 Sheets—Sheet 2.

A. J. REAMS.

ELECTRIC PROGRAM CLOCK.

No. 492,971.

Patented Mar. 7, 1893.



Witnesses.

W. B. Hagin.

F. H. Poore

Inventor.

Andrew J. Reams.

By Wm J Hutchins atty.

UNITED STATES PATENT OFFICE.

ANDREW J. REAMS, OF WICHITA, KANSAS.

ELECTRIC PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 492,971, dated March 7, 1893.

Application filed August 3, 1891. Serial No. 401,599. (No model.)

To all whom it may concern:

Be it known that I, ANDREW J. REAMS, a citizen of the United States of America, residing at Wichita, in the county of Sedgwick and State of Kansas, have invented certain new and useful Improvements in Electric Program-Clocks and Annunciators, of which the following is a specification, reference being had therein to the accompanying drawings and the letters and figures of reference thereon, forming a part of this specification, in which—

Figure 1. is a face plan of the program annunciator, suitably incased. Fig. 2. a rear plan of the electrical mechanism thereof separate from the case. Fig. 3. a vertical cross-sectional view of the inclosing case and dial thereof and a side view of the electrical mechanism thereof. Fig. 4. is a view representing the program annunciators arranged into position as when in service and in communication with the clock mechanism through the agency of conducting wires. Fig. 5. is a detailed view representing a portion of a clock as constructed for service in connection with the electric program annunciators. Fig. 6. is a detailed side view of the relay of the annunciator mechanism.

This invention relates to certain improvements in an electric program annunciator, or what is known by some persons as a program clock, and has relation to that class of clocks in which electric bells or similar alarms are sounded at given intervals by means of mechanism for making and breaking an electric current or currents connected to the works of a clock, and contemplates certain improvements on devices of this class, and consists, to that end, in the improved construction and combination of parts in which the electric current operating the alarm, or alarms, is broken during the time the alarm or alarms are not wanted; and in which means are provided for making and breaking the electric current or currents, and for the improved operations of the mechanism for making and breaking the circuit or circuits, as hereinafter more fully described and particularly pointed out in the claims.

Referring to the drawings A represents a case made to accommodate therein the electrical mechanism of the program annunciator, supports on the top or other suitable place, thereon is an electric alarm bell B, and has secured to its front a clock dial I divided into one hundred and forty four parts or annular divisions of five minutes each, which divisions are consecutively marked by minute indicating figures, as shown in Fig. 1., and about said dial has secured thereto a metal ring R having one hundred and forty four perforations P corresponding with the five minute divisions of the dial.

Aside from the electric alarm bell, the electrical mechanism, of the annunciator, consists of a local circuit, and of a relay E, of the ordinary construction; for opening and closing the local circuit, the construction of the said circuit mechanism being as follows.

F is a frame secured to the front wall within case A.

1 represents an electro-magnet supported by the frame as is likewise supported a post 2 adjacent the electro-magnet.

3 represents an armature secured to a lever L which lever is fulcrumed to post 2 and properly holds the armature relative to the electro-magnet.

D represents an arbor suitably bearing in the frame, arranged extending forward through the dial I and bears on said extending end a hand or indicating pointer N which bears on its end portion a suitable metallic brush y adapted to move on its circuit with the hand, above or a distance from the perforations of ring R, and adapted to engage with pins or plugs P′ which are removably set in said perforations. Said arbor bears, within the frame F a ratchet wheel 9 which is provided with one hundred and forty four ratchet teeth corresponding with the five minute division of the dial.

4 represents a pawl pivotally secured at its lower end to lever L and yieldingly held in contact at its upper end by means of the spring 5 which is secured to said lever, as shown. The upper end portion of said pawl is hooked so as to engage the ratchet wheel teeth when moved down, and pass the said teeth when moved upward, and is further provided with an opposite extending portion

11 which when the pawl is lowered engages with a set screw 8, which is made adjustable for the purpose of assisting in holding the pawl in engagement with the ratchet teeth and preventing the pawl from slipping a tooth on its downward movement.

10 is a retaining spring pawl set to engage, at its free end, the teeth of the ratchet wheel to prevent rotation of the wheel in the wrong direction.

6 represents a retractile spring fixed at its lower end to the frame and at its upper end to lever L to yieldingly hold the armature from contact with the electro-magnets and to lower the pawl and thereby partially rotate the ratchet wheel at such times as the pawl has been moved upward.

7 represents an adjusting screw to regulate the throw of lever L and for that purpose is set in a bracket of post 2 below the lever and adjusted to engage with the lever.

The relay E is represented as located below frame F.

The electric bell B is represented as located on the case A with the mechanism thereof fixed to an ornamental top piece of the case and the sounding bell fixed to the face of said top piece; the sounding bell only being exposed to view from the front. However the arrangement of said bell is not essential. To one binding post of the bell an electric conducting wire d is arranged leading to and connecting with the dial ring R (see Fig. 2.) To the opposite binding post of the bell, is a second like conductor d' connected and arranged leading to and connecting a binding post 12 within the case, which binding post is connected to one terminal of a local battery G, by means of a conducting wire a. In the construction of this annunciator I prefer to locate said battery at the top of case A in rear of the ornamental top, in which position it is represented in Fig. 2. Also one terminal of the electro magnet 1 is connected with said binding post by means of the conductor wire m'; the other terminal of the said electro-magnet is electrically connected with the frame F by means of the conductor wire m'' (see Fig. 3.) The other terminal of the local battery G is, by means of the conductor a', connected to one wire of the make and break piece of the relay E and the other wire from the said make and break piece is connected to the frame F by means of the conductor m.

In Fig. 4, K represents a clock, for registering ordinary time.

In Fig. 5, K' represents a portion of said clock mechanism in which 13 represents the arbor of the minute hand of the clock, and this arbor is provided with a disk 14 having twelve forwardly projecting pins e on its rim and corresponding in position to the five minute division of time on the dial of the clock; on the third wheel arbor of the striking side of the clock is secured an eccentric shaped disk 19 suitably arranged to engage the free end of a spring arm 20, which is secured to an insulated block 21, which block is secured to the clock frame; the clock movement being provided with the usual mechanism for releasing the striking train, and in this construction of disk 14, which being provided with the twelve pins e, instead of but one such pin as in the usual clock construction, the striking train is released every five minutes, instead of every hour as is usual, and the clock in this instance does not strike, the hammer and striking wheel being dispensed with, but instead it causes the main line circuit, which is represented at w w' and w'' having interposed therein a battery H, and which conductor lines connect, one, shown at w, to the contact spring 20 of the clock, and one shown at w'' to the clock frame at one terminal and to the main battery H at the other terminal, to be closed and opened for very short intervals every five minutes as the clock runs; being closed when the disk 19 is in contact with the spring arm 20, during the rotation of said disk at intervals of five minutes; thus closing and opening all the relays on the main line, of which there would be as many as there would be program annunciators in the several rooms of a building where used. One main line conductor w leads from the main battery H and runs parallel with line w' throughout the building where the annunciators are located and at their terminal said wires connect together thus forming a circuit line, and the relays of the annunciators in service are respectively connected with said main lines, through the agency of their conductors t and t', in parallel as, shown.

The operation may be described as follows. As the time clock runs the striking mechanism, or in this instance, the transmitting side of the clock will be released every five minutes and will cause the eccentric disk 19 to make one revolution every five minutes; thus said eccentric disk acts as a transmitter and is brought in contact with the contact arm 20 at each such rotation, being in such contact a short interval at each rotation, and when in such contact the circuit is completed through the main line, and vitalizing each relay so placed on the line attracting the armature of each relay thereby closing the circuit of the local battery. Now it will be obvious that if a plug P' is inserted in the metal ring R of an annunciator, corresponding to any given time, and the brush y of the hand N is in contact with said plug, the bell circuit will be completed, through the medium of the hand N, the arbor thereof the frame F, the perforated ring R and the conducting wires, and the bell will be caused to ring, while the eccentric disk 19 is in contact with the contact arm 20 and as the said disk leaves the said contact arm contact is broken in the main line and

the relay magnets are demagnetized and their armatures are drawn away and the circuit in the battery is thus broken and the bell ceases to ring, and the electro-magnets 1 are demagnetized and their armatures are released and the retractile springs of said armature levers act to lower the end of said levers to which they are attached causing their connected pawls to act on their respective ratchet wheel and partially rotate said wheels at each such down movement of the pawls thereby at each such movement advancing the said wheels one tooth, thereby causing their arbors to likewise move and move the face hands N the space of five minutes each such move. This operation is repeated every five minutes, in accordance with the five minute division of the mechanism brought into service, and it is obvious that the time will be indicated by the hand N, of each annunciator, every five minutes and the alarm bell sounded on any time where a plug is inserted in a perforation of a ring R and the brush of the hand N brought in contact with such plug, so any number of rooms can be provided with an annunciator in each room, as in schools, and each annunciator having plugs set in its perforated ring R, corresponding with the program time of its respective room, and each indicate the time at intervals of five minutes, throughout the day, and announce the time of recitations and the like as laid out in the program for the day, by sounding the bell at the beginning and closing of each recitation, or arranging the plugs P′ to cause the bell to sound at such time or times as may be desired relative to the program. By the construction described the annunciator hands make a complete circuit each twelve hours being moved a space each five minutes or twelve spaces each hour, or one hundred and forty four spaces each twelve hours, therefore it becomes possible to announce a recitation or recitations at intervals of five minutes or of any greater length of time during a day, by simply arranging the plugs P′ to correspond with the time of announcing the recitations thus causing the bell to sound each time a plug is engaged by the hand brush.

Having thus described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is as follows:

1. An electric program clock and annunciator comprising, a case, a face dial, a perforated metallic face ring, a local battery, an electric announcing bell, a relay, an electro-magnet, an armature arranged to be attracted by said magnet, a lever arranged supporting said armature, a pawl connected with and adapted to be operated with the lever, a retractile spring arranged connecting the lever and adapted to actuate the lever and pawl when said electro magnet becomes demagnetized and releases the armature, an arbor bearing a ratchet wheel arranged to be engaged and actuated by the pawl, and also bearing a hand having a metallic brush adapted to engage with pins or plugs set in the perforations of the face ring, with electric conductors for connecting said parts in the manner set forth; in combination with the main line conductors and battery thereof, and the transmitting mechanism of a clock, substantially as and for the purpose specified.

2. The combination with the clock provided with the transmitting mechanism, and with the main line conductors and battery thereof arranged connecting said clock mechanism and adapted to have the circuit intermittently made and broken by said clock mechanism, of the electric program clock and annunciator comprising a face dial, a metallic ring adjacent the dial, an arbor carrying a face hand having a brush or equivalent device for engaging with plugs or projections of said face ring, and a ratchet wheel in the rear of said dial, a pawl and lever mechanism for actuating the ratchet wheel and hand, a retractile spring, an electro magnet and armature for actuating the lever, and pawl; a local battery, an electrical bell; a relay for making and breaking the local circuit, and electrical conductors for connecting said parts in the manner and for the purpose substantially as set forth.

3. In the electric program clock and annunciator described, the combination of the main lines and battery thereof; the relay connected in parallel with said main lines; the electro-magnet electrically connected with the relay; the frame supporting the electro-magnet; the lever pivotally supported by the frame and carrying at one end the magnet armature, and at its opposite end the pawl, held upright to its work, by a spring; the ratchet wheel carried on the hand arbor, supported by the frame, and adapted to be engaged by the pawl; and the retractile spring arranged and connecting the lever, substantially as and for the purpose set forth.

4. In the electric program clock and annunciator described, the combination with the main line and battery thereof,; the relay connected in parallel with said main lines; the electromagnet electrically connected with the relay; the lever carrying the magnet armature at one end, and the pawl at its opposite end; the retractile spring connected to hold down the spring; the ratchet wheel carried on the hand arbor, and adapted to be engaged and actuated by the pawl; the face indicating hand carrying a brush; the face ring arranged adjacent the path of said hand brush, and having studs or lugs adapted to be engaged by said brush during its circuit; and of the electric announcing bell electrically connected with said face ring, and with the electro-magnet, substantially as and for the purpose set forth.

5. The combination with the main line circuit, and local circuit, of a clock for periodically making and breaking said main line

circuit, a relay in said main line circuit for making and breaking said local circuit, electro-magnetic operating mechanism in the local circuit for moving an indicating hand, a branch in the local circuit, one or more projections forming one terminal of said branch circuit, a brush carried by the indicating hand forming the other terminal, and a suitable annunciator in the branch circuit, operated upon the contact of the brush with one of the projections, substantially as specified.

ANDREW J. REAMS.

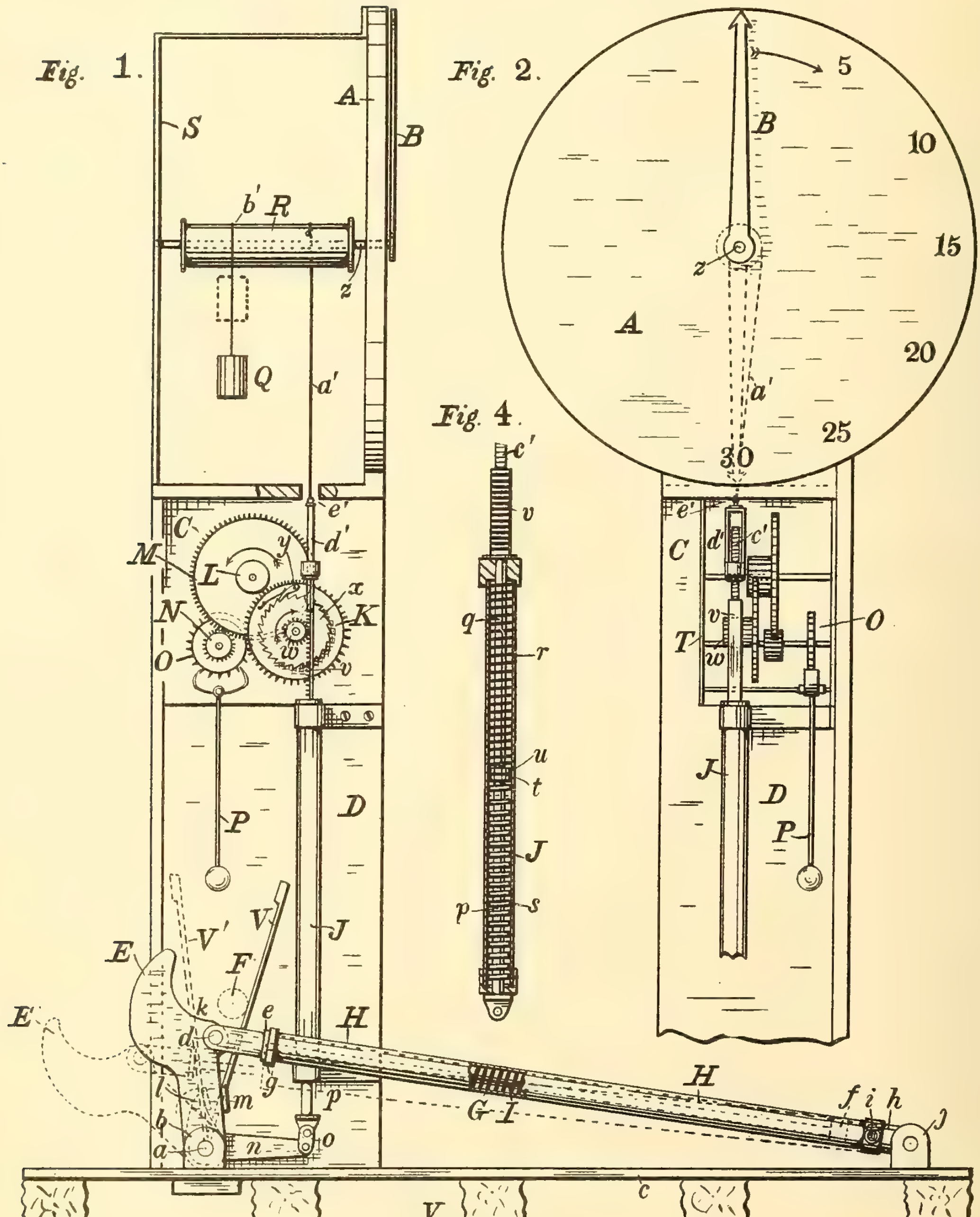
Witnesses:
WM. J. HUTCHINS,
N. B. HAGIN.

(No Model.)

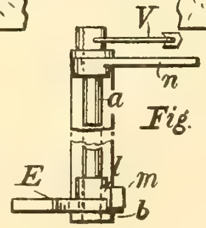
A. C. GORDON.

RAILWAY TIME SIGNAL.

No. 493,083. Patented Mar. 7, 1893.



Witnesses:
G. S. Dey
C. G. Crannell.



Inventor:
Angus C. Gordon,
By Geo. B. Selden,
Atty.

UNITED STATES PATENT OFFICE.

ANGUS C. GORDON, OF ROCHESTER, NEW YORK.

RAILWAY TIME-SIGNAL.

SPECIFICATION forming part of Letters Patent No. 493,083, dated March 7, 1893.

Application filed September 1, 1892. Serial No. 444,804. (No model.)

To all whom it may concern:

Be it known that I, ANGUS C. GORDON, a citizen of the United States, residing at Rochester, in the county of Monroe, in the State of New York, have invented an Improved Railway-Signal, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to an improved railway signal, designed to display a visible signal for a limited period of time to indicate the number of minutes which have elapsed since the passage of the last train.

My improved railway signal is fully described and illustrated in the following specification and the accompanying drawings,—the novel features thereof being specified in the claims annexed to the said specification.

In the accompanying drawings representing my improved railway signal;—Figure 1 is a side elevation, showing the mechanism for operating the signal from a passing engine or train. Fig. 2 is a partial side-elevation, taken at right angles to Fig. 1. Fig. 3 is a plan view of the operating mechanism. Fig. 4 is a section showing the springs.

My improved railway signal consists essentially of an upright or standard arranged at a suitable distance from the track, and supporting a dial and pointer, and a clock-work arranged to be set in operation by a passing train, so that up to a certain period of time, preferably half-an-hour, after the passage of such train, the engineer of the next succeeding train is notified how many minutes have elapsed since the last preceding train passed. The clock-work actuates the pointer for half-an-hour after the passage of the train,—and the next train restores the pointer to its original position and again starts the clock-work into operation. The clock-work is arranged or constructed so as to run for only a definite period of time.

A represents the dial, B the pointer, C the clock-work, D the standard, and E the operating lever, which is arranged at a suitable distance from the rails in such position as to be moved by the arm or roller F on the engine or train. The dial is arranged to face the engineer on an approaching train. The pointer B, when the clock-work has been started, begins to move in the direction indicated by the arrow in Fig. 2, and continues such movement for thirty minutes,—the dial being provided with a suitable corresponding graduation. At the end of this period, the clock ceases to drive the pointer, and the engineer of the next train is informed that the preceding train is at least one-half an hour in advance. If the pointer occupies any intermediate position, the engineer will know from such indication, how many minutes have elapsed since the preceding train passed the signal.

It will be understood that the signals will be placed at suitable distances apart along the line of the road,—say one or two miles and preferably on both sides of the track. The clock-work is arranged so that the pendulum or vibrating part is set in motion at the same time that the pointer is restored to position and the spring which operates the clock-work is set by a passing train. This is effected as will hereinafter be described by the superior force of spring *s* which is normally overcome by the spring G and so as to be held away from spring *r*.

The lever E is pivoted on the rod *a* arranged to turn in any suitable supports, such as indicated at *b* in the drawings. The rod *a* extends outward from the track to the point where the standard is erected. The signal may be supported by a bar or plank *c* attached to the ties,—the lower end of the standard being inserted in the ground.

The lever E is swung by the contact of the lug or roller F from the position indicated by the full lines in Fig. 1, to that represented by the dotted lines E′,—this movement compressing the spring G in the tube H, which, immediately after the lug F has passed restores the lever to its original position. A rod I passes through the spring in the tube, being pivoted to the lever E at one end, as indicated at *d*, Fig. 1, and at the other end provided with a piston or follower, *f*, which bears against the spring G. The tube H is provided with a head *g*, through which the rod I slides. The rod I is provided with a stop or collar *e*, which limits the movement of the spring and the lever. At the other end the tube has a head *h* which is pivoted in a suitable bracket *j* attached to the bar *c* or other suitable support. In order to control the re-

turn movement of the lever, an air-inlet valve may be attached to the tube, as indicated at i, Fig. 1. This valve opens inward and permits the free entrance of the air behind the piston f, but retards its escape, so that it returns at a graduated speed.

The upper end of the lever E is preferably given a curved form,—the lower part of the curve being inclined upward, as shown at k, so that it may be started in motion gradually and without shock by the contact of the lug F. The construction is such that the lug aided by spring s has only to overcome the inertia of the lever and the resistance of the spring G, since the lever turns freely on the rod a.

The rod or rock-shaft a is provided with an arm l, which has a lug m which projects over the edge of the lever E. At the end away from the track, the rock-shaft a is provided with an arm n, which is connected by a suitable link o or other device with a rod p which slides inside the tube J supported in any suitable way from the standard. The tube J contains two springs, r and s, Fig. 4, of different tensions,—the lower one s being the stronger of the two. The rod p runs through a head on the lower end of the tube J, extends through the spring s, and is provided with a head t, Fig. 4, which bears on the upper end of the spring. When the lever E moves from E to E′, the spring s expands, compressing the spring r, and turning the rock-shaft a so that the lug m is held in contact with the edge of the lever until said spring has expanded and lifted rods p and q with the effect to compress spring r. Said spring s therefore through the medium of arm n, rock shaft a, and rock shaft t and lug m normally acts upon lever E in opposition to spring I′ and diminishes the force required to operate said lever by the train. The return movement of the lever E, under the influence of the spring G, draws the rod p downward, and compresses the spring s,—thus allowing the spring r to expand, and this movement of the spring r operates the clock-work and is regulated by the escapement, as hereinafter described. The rod q passes through the spring r,—being provided at the lower end with the head u, Fig. 4. At its upper end, the rod q is provided with a rack v, which engages with a pinion w, which is connected to the ratchet wheel x, so that the pinion and ratchet revolve together. A spring pawl y, Fig. 1, on the gear K of the clock-work, engages with the teeth of the ratchet wheel x. As the rod q and rack v rise upward, the ratchet-wheel turns from right to left, in Fig. 1, the pawl y passing freely over the teeth,—no movement being imparted to the clock work. When however the rack v is lowered by the action of spring r the pawl engaging the teeth of the ratchet wheel drives the gear K, and this movement is transmitted, through a suitable train of gears, such as L, M, N, to the escapement wheel O, the movements of which are controlled by the oscillations of the pendulum P, or other suitable vibrating part. The rod q is connected with the shaft z of the pointer, by the chain, cord, or other suitable device, a', so that the descent of the rod and rack, which is regulated by the clock-work, turns the pointer from left to right, as indicated by the arrow in Fig. 2. When the rod q is raised upward the return movement of the pointer is secured, by the weight Q, attached to the cord b', which runs over the spool R, on the shaft z, which carries the pointer B. The shaft z is supported by a suitable frame-work S, to the front of which the dial is attached. The pointer may be protected by a glass plate. The shafts of the clock-work are supported by a suitable frame T, Fig. 2,—one side of which is omitted in Fig. 1.

The clock-work is of any ordinary or preferred construction, adapted to run for the length of time which the pointer is intended to indicate. The escapement may be of any ordinary type, and the oscillating or vibrating member of it, is arranged to be set in motion by an arm or lever V, Figs. 1 and 3 on the rock-shaft a. When the rock-shaft is turned by the spring s, the arm V swings to V′, Fig. 1, and moves the pendulum P to the left-hand, so that as soon as the arm returns to its original position, the pendulum begins its swing. Suitable guides may be provided, to prevent too great lateral movement of the pendulum, and to confine the arm V to the proper path. The arm V is itself a spring, or it may be provided with a spring at its upper end, to prevent its striking the pendulum too hard. Said arm is moved by the rocking of shaft a to which it is fixed the shaft being moved initially in one direction by the combined action of spring s and of a train. The shaft is rocked back and arm V removed from the pendulum to permit it to swing by spring G which comes into action as soon as the lug F passes off from lever E.

The rack v terminates in a threaded rod c', on which the turn-buckle d' is fitted, so that, the flexible connection a' being attached to a swivel eye e' at the upper end of the turn-buckle, the length of the connection may be adjusted to bring the pointer accurately to the proper position. The turn-buckle may be secured in place on the rod by a jam-nut

It will be observed that the passage of a train will restore the pointer to the upright position, whether it has moved the whole of the half-revolution, or only a portion of the same.

It will be obvious to the skilled constructor that many changes or modifications may be made in the construction of my improved railway-signal, without departure from the essential features thereof. Thus the pointer may be made to travel in a straight line, a spring may be substituted for the weight Q, a weight may be employed to actuate the clock movement instead of the spring r, the clock-movement may be of a different construction

from that shown, and located in any suitable relation with the pointer, the ratchet mechanism may be variously modified, different kinds of springs may be employed, and any suitable mechanism for operating the clock from a passing engine or train may be adopted. It will also be understood that the lever E and attachments may be used in connection with movable railway-signals other than that herein described. It will also be understood that an ordinary clock-movement operated by a spring can be attached to furnish the greater part of the motive power requisite to operate the pointer.

I claim—

1. In a railway signal, a clock movement, a spring to operate it, a spring adapted to be compressed by a passing train and an intermediate spring stronger than the first named and adapted to act against it and to act with that compressed by the train whereby said intermediate spring cooperates with the train and compresses the clock spring, substantially as set forth.

2. In a railway signal, a movable device such as lever E in the path of the train and a spring such as *s* normally acting to aid the train in moving said device, substantially as set forth.

3. In a railway signal, a clock having a motor to run it a definite period, a clock starting device independent of the clock adapted to be operated by the passing of a train at any moment between the beginning and end of said period, consisting of a rock shaft having an arm V and an arm E the latter being arranged in the path of a moving train, substantially as set forth.

4. The combination, in a railway signal, of the movable pointer B, the clock-movement C, arranged to regulate the pointer and actuated by a spring, a second stronger as *s* spring acting in opposition to the first, and mechanism operated by a passing train whereby the second spring is released to compress the first to actuate the clock-movement during its expansion, said second spring normally cooperating with the train to diminish the shock of its impact substantially as described.

5. The combination, in a railway-signal, of the movable pointer B, the clock-movement C arranged to move the pointer and operated by the spring *r*, the stronger spring *s*, acting in opposition to the spring *r*, and a movable arm E arranged to be moved by a projection on a passing train, and provided with a spring G acting in opposition to the spring *s*, substantially as described.

6. The combination, in a railway-signal, of the movable pointer B, the clock-movement C, the spring *r* for actuating the clock-movement, rack *v*, pinion *w*, and ratchet *x y*, and mechanism arranged to be operated by a passing train and adapted to compress the spring, said spring being connected and adapted to actuate the clock movement substantially as set forth.

7. The combination, in a railway-signal, of a movable pointer regulated by a spring actuated clock-movement, the arm E, arranged to be moved by a projection on a passing train and provided with spring G, the rock-shaft *a*, having arms *l* and *n*, and the spring *s*, arranged to act in opposition to the spring which actuates the clock movement, substantially as described.

8. The combination, with a movable railway signal, of the pivoted lever E, having inclined surface *k*, and the spring G, substantially as described.

9. The combination, with a movable railway signal, of the pivoted lever E, having inclined surface *k*, the spring G and tube H, substantially as described.

10. The combination, with a movable railway-signal, of the pivoted lever E, having inclined surface *k*, the spring G, tube H, rod I having follower *f*, and air-valve *i*, substantially as described.

11. The combination, in a railway-signal, of a movable pointer, a clock-movement operated by a spring arranged to be compressed by a passing train, the lever E, spring G, rock-shaft *a*, and arm V, arranged to start the clock-movement, substantially as described.

ANGUS C. GORDON.

Witnesses:
GEO. B. SELDEN,
J. WATSON SIMS.

(No Model.)

N. B. REES.

TIME LOCK.

No. 493,115. Patented Mar. 7, 1893.

Fig 1.

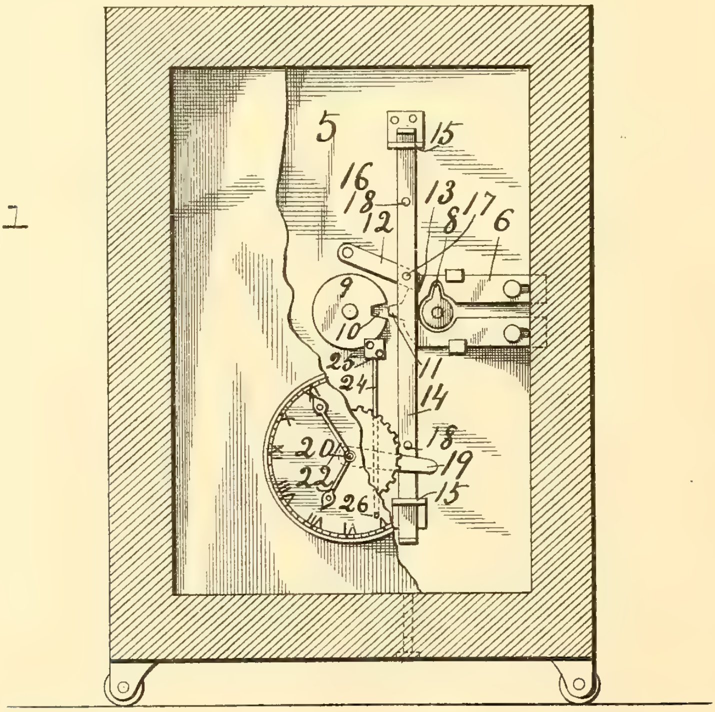
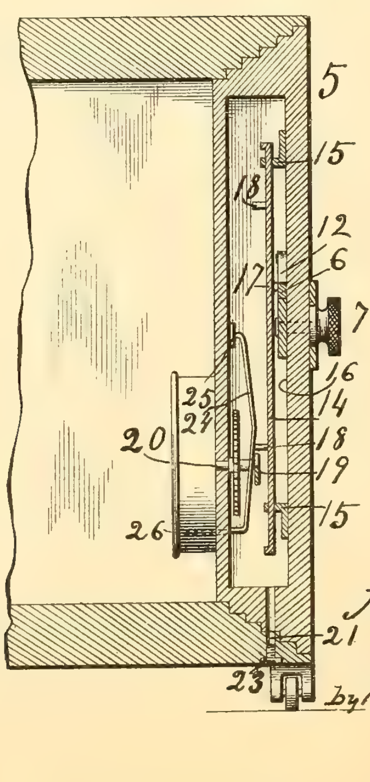


Fig 2.



Witnesses

John Lawrie

M. C. Hillyard

Inventor

Napoleon B Rees.

by W. X. Stevens Attorney

UNITED STATES PATENT OFFICE.

NAPOLEON B. REES, OF LINCOLN, KANSAS.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 493,115, dated March 7, 1893.

Application filed July 21, 1892. Serial No. 440,807. (No model.)

To all whom it may concern:

Be it known that I, NAPOLEON B. REES, a citizen of the United States, residing at Lincoln, in the county of Lincoln and State of Kansas, have invented certain new and useful Improvements in Time-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to that class of locks which are connected with clockwork so arranged as to prevent them from being unlocked except at a given time by the clock, and its object is to produce a simple stop or bar to prevent withdrawing a lock-bolt until a given time and means for automatically releasing the lock-bolt so that it may be operated at that time; and in certain means in the nature of a secret arrangement whereby the lock-bolt may be released if anything should get out of order with the clock works.

To this end my invention consists in the construction and combination of parts forming a "time lock" hereinafter described and claimed, reference being had to the accompanying drawings, in which:

Figure I, is a view of a portion of the inside of a safe door partly broken away to show my invention within. Fig. II, represents a portion of a safe door in vertical section through its thickness showing my invention.

5 represents the door of a safe, 6 the locking-bolt, 7 a knob having a finger 8, to engage the bolt 6 whereby the same may be slid to and fro to lock and unlock the door.

9 is a guard which must have its notch 10 set to receive the rear end 11, of the bolt 6 before the bolt can be operated. This guard is shown to represent a guard of any combination lock and all the parts thus far described may be of any usual or preferred arrangement as they are not my invention.

12 represents a latch pivoted to the door or to the lock plate 16, and it is adapted to fall by gravity to engage a rear shoulder 13 of the bolt 6 when it is in its forward or locked position to hold it from being withdrawn or unlocked.

14 is a lifting rod fitted to slide vertically in studs 15 which project from the lock plate, and it is connected with the latch 12 by means of a pivot stud 17 whereby its weight is added to the weight of the latch to insure the falling of the latter when the bolt is locked.

18 represents one or more studs upon the lifting rod and 19 is a lever carried by the spindle 20 of a clock, and one of the studs 18 is in the circular path of this lever so that the clock in its progress of usual movement will at a given time, bring the lever 19 into engagement with a stud 18 and lift the rod 14 and latch 12 so that the bolt may be withdrawn or unlocked. There may be any number of clocks, each provided with a lever 19 to engage one of the studs 18, thus guarding against accident to any clock and insuring the release of the lock bolt at the given time even if one clock should fail. But to further enable those in the secret to open the safe door if the clocks fail I provide an aperture 21 directly through the safe and door under the lifting rod 14, to admit a rod from the outside, whereby my safety latch 12 may be raised and then anyone knowing the combination may unlock the door. This aperture 21 may be closed at the bottom by a screw plug 23 so as to be undiscoverable unless the secret is known to one searching for it. The relation between the clock hands 22 and the lever 19 may be changed so as to set the lever to engage the lifting rod 14 and release the bolt at any desired time, by arranging the time hand with a common friction thimble connection on its spindle 20.

24 is a spring rod fixed at 25 to the inside of the door, with the opposite end 26 projecting into the path of the minute hand of the clock. This rod is curved to project into the path of the arm 19 to be pushed thereby so that the end 26 will be projected at the time when the lifting rod 14 is raised and will stop the clock before the minute hand makes another circuit and before the arm 19 can escape from the stud 18, thus preventing the safe being

relocked even if not opened immediately on the appointed hour.

Having thus fully described my invention, what I believe to be new, and desire to secure by Letters Patent, is the following:

The combination in a time lock; of a locking bolt fitted to slide in a frame; a latch to engage and stop the bolt; a clock upon the said frame; a rod fitted to lift the said latch; a lever communicating between the clock and lifting rod; and a spring rod fixed at one end to the frame and projecting at the other end into the path of the clock hand, and projecting midway into the path of the said lever, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

NAPOLEON B. REES.

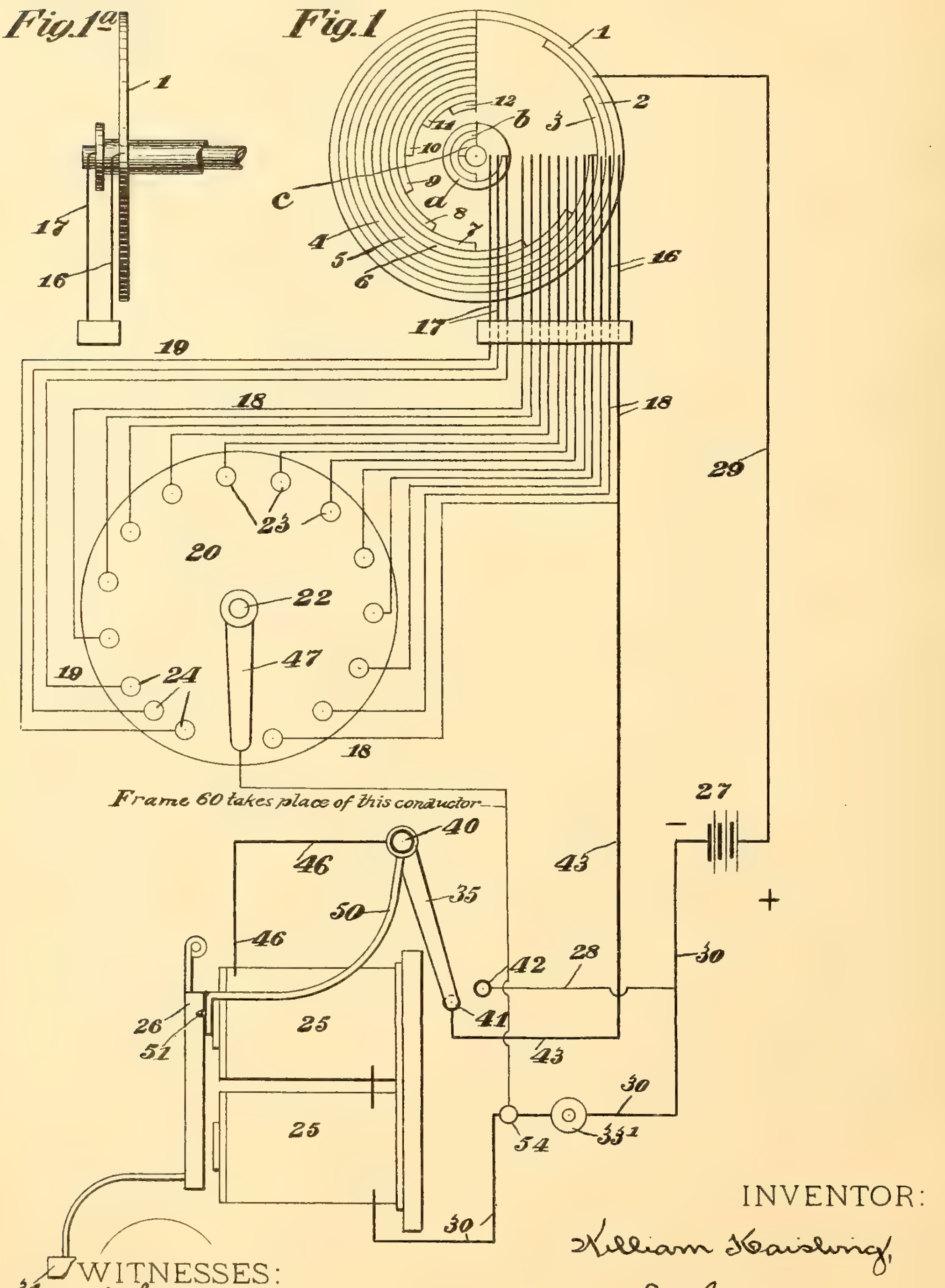
Witnesses:
W. H. CECIL,
W. S. GREEN.

(No Model.) 2 Sheets—Sheet 1.

W. KAISLING.

ELECTRIC CLOCK STRIKING MECHANISM.

No. 493,777. Patented Mar. 21, 1893.



WITNESSES:

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Percy M. Ewing.

INVENTOR:

William Kaisling,

By

A. D. Lewis

Attorney.

(No Model.) 2 Sheets—Sheet 2.

W. KAISLING.

ELECTRIC CLOCK STRIKING MECHANISM.

No. 493,777. Patented Mar. 21, 1893.

Fig. 2

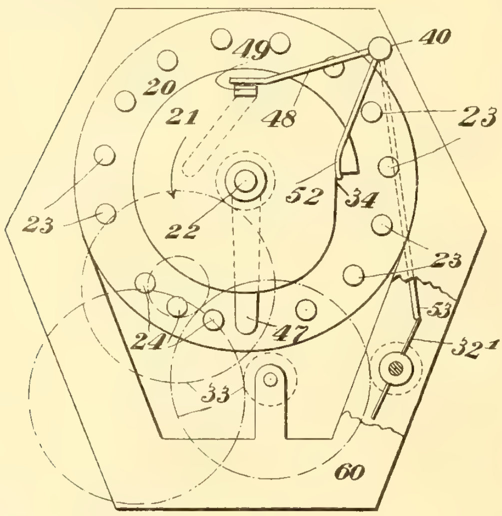


Fig. 3

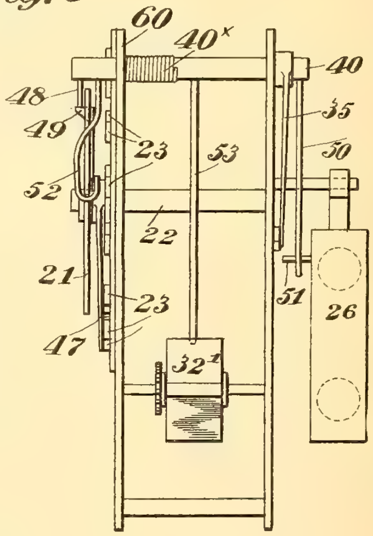
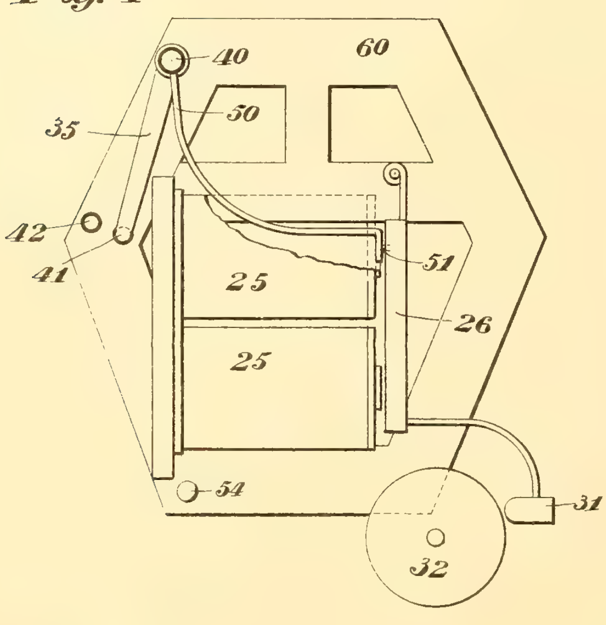


Fig. 4



INVENTOR:

William Kaisling

WITNESSES:

J. B. Caplinger

Percy M Irving

By C. D. Lewis

Attorney.

UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF ALLEGHENY, PENNSYLVANIA.

ELECTRIC CLOCK STRIKING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 493,777, dated March 21, 1893.

Application filed April 4, 1892. Serial No. 427,723. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Electric Time-Annunciators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improved electric annunciator for clocks, and consists in certain details of construction, and combination of parts as will be fully described hereinafter.

In the accompanying drawings, Figure 1 is a diagraphic view showing the several electric circuits and portions of the mechanical devices which form the subject of the present invention and Fig. 1ª is a fragmentary detail to be referred to hereinafter. Fig. 2 is a face view of the mechanism for closing the several bell ringing circuits and Fig. 3 is a side view of the same. Fig. 4 is a rear elevation of the same showing the mechanism seen at the right in Fig. 3.

The object of my invention is to provide an electric apparatus which when connected with an ordinary time clock will indicate the hours, and quarters; by successive taps on a bell, thus providing a device by the use of which the time of the day may be indicated at a number of different points or places, with but one clock or time piece.

To construct an apparatus in accordance with my invention I provide a contact disk and attach the same to the sleeve ordinarily carrying the hour hand or pointer. This disk consists of a flat piece of metal having a series of contacts, 1—2—3—, &c., which extends in concentric semi-circles about the face of the disk, and of varying lengths—from a complete circle 1, to one twelfth of a circle 12, at the inside, thus leaving an irregular spiral shaped space about the center of the disk. Fixed to the shaft of the clock ordinarily carrying the minute hand is a second smaller disk A, bearing three integral contacts *a*, *b*, *c*, equal to three quarters, one half, and one quarter of a circle respectively. This disk A is of a less radius than the radius of the inner semi-circular contact 12 of the series of contacts on disk 1 and is concentric with said disk 1. These contacts *a*—*b*—*c*, are for the purpose of indicating the quarter hours, while those 1–12, inclusive, are for the hours. Placed within reach of the above described contacts is a double comb 16—17, each arm of which is connected by a wire to a disk 20. This disk 20, is provided with fifteen contacts 23, three of which marked 24, are connected to the comb 17, by independent wires 19, and the other contacts 23, by independent wires 18, to the comb 16. This disk 20, is held stationary, and is provided with a revolving contact arm 47, which is operated by a barrel spring (not shown) and train of gearing 33, of the character usually employed in clocks for the purpose of giving the said moving contact arm 47, a slow rotary movement. Attached to a suitable point near the disk 20, is a magnet 25, and armature 26, which is connected to the battery 27, in a manner hereinafter described. Attached to the armature 26, is a tapper 31, which is within reach of a bell 32, and is adapted to strike the same when the said armature has been attracted by the magnets.

Mounted in the frame 60, carrying the revolving contact arm 47, is a shaft 40, to which is secured a contact arm 35, which is insulated from the said shaft 40, and capable of a limited movement to make separate electric connections with two stationary contacts 41—42. One of these contacts, 41, is connected by a wire 43, to the wire 18, connecting the first contact 1, of the hour disk. The other contact 42, is connected by a wire 28 with the negative pole of the battery 27, and the said arm 35 with the magnets 25, and the magnets to the binding post 54 on the frame 60. Secured in this same frame 60, on another shaft is a disk or wheel 21, having a notch 34, formed in its periphery, in which a bent wire 52, connected to the shaft 40, rests, which bent wire serves to slightly revolve the shaft 40, and thereby move the arm 35, from the contact 41, to the contact 42. Connected to this same shaft 40 is a short arm 48, which bears at its outer end upon the upper surface of a spring catch 49, mounted on disk 21, and from the underside of said shaft 40 projects

a second arm 50, the extremity of which is bent downward so as to lie in the path of a projecting finger 51, on the armature 26, as clearly seen in Fig. 3 of the drawings. The operating spring, and its connected train of gearing 33, are held in check by an arm 53, bearing against one of the speed fans or regulators, 32′ and the said arm 53, released from the fan 32′, by another lever 50 engaging with a pin, 51 projecting from one side of the armature 26. Thus it will be seen that when the armature 26, is drawn toward the magnet 25, by the flow of a current of electricity therethrough, the shaft 40 is partially rotated, such rotation being only sufficient to disengage the arm 53 from the regulator 32′ and set the clock work driven by the spring above mentioned and the gearing 33 in motion, the spring catch 49, preventing, by its engagement with the arm 48, the further rotation of said shaft 40 whereby the arm 35, would be brought into contact with the contact piece 42. The clock work being thus set in motion, the disk 21 is rotated, whereby the catch 49 is moved from under the arm 48, on shaft 40 and said shaft 40 is still further rotated by the engagement of the arm 52 with the periphery of the disk 21, beyond the notch 34, the direction of rotation of the disk being indicated by the arrow in Fig. 2. A small spiral spring $40^{\times}$ mounted on shaft 40, one end of which is, secured to the shaft and the other end to the frame 60 serves to retract said shaft to its normal position (seen in Fig. 2) after the disk 21 has made a complete rotation and the arm 52 has again fallen into notch 34, lifting arm 48, up so that its extremity rests again above the catch 49, which wipes in to allow of the upward movement of said arm as will be readily understood.

A clock is provided and placed at a suitable position in one of the rooms, and one of the instruments for striking the bell 32, placed in another room some distance away, and electrically connected as described. A wire 29, connects the outside contact 1, of the large disk with the positive pole of the battery 27 and another wire 28, connects the negative pole of the battery with the contact 42 set in the frame 60. Another wire 30 connects said positive pole of the battery with the binding screw 54, set in frame 60, the circuit through said wire 30 being normally open by the provision of a circuit breaker or push button 33′ therein. The contacts 1–12, are so arranged on the hour sleeve as to bring the points of the comb 16, on the outside contact at one o'clock; the first and second at two o'clock the first, second and third at three o'clock, &c., and hold the said contacts the entire twelve hours. The inner contacts *a—b—c*, are arranged on the minute shaft, in a manner that after the first quarter hour, the first contact will be made with the contact 17, farthest from the center. At and after the half hour two contacts *a—b* will be made, and at and after the three quarters the three contacts *a—b—c* will be made, and at the full hour all three contacts broken, and then again made in the same order.

In operation; when it is desired to ascertain the time within hearing of the bell 32, the button 33′ is pressed which completes a circuit from the negative pole of the battery 27, through the wire 30, and push button 33′, to the binding post 54 on the frame 60, to the magnets 25, through said magnets and wire 46, through the contact arm 35, and contact 41, and wire 43, to the first wire 18, to the contact 1, and wire 29 back to the positive pole of the battery. When this circuit has been completed the armature 26, is attracted toward the magnets 25, moving the lever 50, slightly rotating the shaft 40, until stopped by the engagement of the arm 48 with the upper side of the spring catch 49 on the disk 21 and releasing the fan 32′, which puts the train of gearing 33 in motion. This movement rotates the contact arm 47, and stop disk 21, which are attached to the same shaft, the arm moving over the first contact on the disk 20, complete a circuit, as by this time the disk 21, has moved sufficiently to withdraw the lever 52, from the notch 34, and at the same movement of the disk and lever 52, the lever 50 is moved out of reach of the pin 51, projecting from the armature 26, and at the same time the contact arm 35, is moved over to the contact 42. When this last described contact is made a circuit is completed from the negative pole of the battery 27, through the wire 28, contact 42, arm 35, wire 46, through the magnets 25 to the frame 60, to moving contact arm 47, through the first contact on the disk 20, to wire 18, and comb 16, to contact 1, through said contact 1, and wire 29, to the positive pole of the battery. This circuit when completed attracts the armature to the magnets, and the tapper strikes the bell, 32 which will indicate the hour as one o'clock.

At Fig. 1 on the drawings three of the contacts are made by the comb 16, while but one contact is made with the comb 17, which would give three taps of the bell, and after a short interval of time one tap of the bell. This interval is caused by the space between the last contact of the group of twelve, and the first of the group of three. The bell having been tapped three times in quick succession, and once after an interval of time, the time of day is a quarter past three.

All the circuits for tapping the bell are the same from the contacts on the disk 20, to the battery 27, as above described, and separate and independent wires are used from the said contacts to the two combs 16, and 17.

By means of an apparatus such as described, time may be ascertained at a number of different points by the use of one clock, and several of the instruments for operating the bell.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with the center shaft of a clock carrying a series of contacts, of a stationary series of contacts adapted to contact electrically therewith during the revolution thereof, a second annular series of stationary contacts electrically connected to the last named series of stationary contacts, a contact arm arranged within said annular series and adapted to contact electrically therewith during its revolution, a normally open electric circuit, including a generator and signal, of which circuit each of the respective stationary and moving contacts and said contact arm form terminals, a spring connected with said contact arm and adapted to rotate the same, a detent for holding said contact arm against rotation, and means for disengaging said detent, whereby said circuit is closed and the signal operated, substantially as set forth.

2. The combination with the center shaft of a clock, carrying a series of contacts, of a stationary series of contacts adapted to contact electrically therewith at different points in the revolution thereof, a second annular series of stationary contacts electrically connected with the aforesaid series of stationary contacts, a contact arm arranged within said annular series of contacts and adapted to contact electrically therewith during its revolution, a spring connected to said contact arm and adapted to revolve the same, a pivoted detent for holding said contact arm against movement, a normally open electric circuit including a generator and signal of which each of the respective stationary and moving contacts and said contact arm form terminals, a normally open electric circuit including a generator and an electro-magnet, the armature of said magnet, said armature being arranged to engage said pivoted detent in its movement and release said spring, and means for closing said last named circuit whereby the contact arm is released and said first named circuit closed and the signal therein operated, substantially as set forth.

3. The combination with the center shaft of a clock carrying a series of contacts, of a stationary series of contacts adapted to contact electrically therewith during the revolution thereof, a second annular series of stationary contacts electrically connected to said last named series of stationary contacts, a contact arm arranged within said annular series of stationary contacts and adapted to contact electrically therewith in its revolution, a spring connected to said contact arm and adapted to revolve the same, a pivoted detent for holding said contact arm against movement, a normally open electric circuit including a generator and a signal of which circuit each of the respective stationary and moving contacts and said contact arm and said detent form terminals, a contact point in said circuit arranged in the path of said detent and forming a terminal of said circuit, a notched disk on the said contact arm and adapted to revolve therewith, a projection on said detent engaging said notch in the disk, a normally open electric circuit including a generator and an electro-magnet, the armature of said electro-magnet, said armature being arranged to engage said pivoted detent in its movement and disengage the same from said spring, and means for closing said last named circuit, whereby the signal is operated, substantially as set forth.

4. The combination with the center shaft of a clock, carrying a series of contacts, of a stationary series of contacts adapted to contact electrically therewith during the revolution thereof, a second annular series of stationary contacts electrically connected with said last named series of stationary contacts, a contact arm arranged within said annular series of stationary contacts and adapted to contact electrically therewith during its revolution, a spring connected to said contact arm and adapted to revolve the same, a shaft bearing a detent for holding said arm against movement, a normally open electric circuit including a generator and a signal of which circuit each of the respective stationary and moving contacts and said contact arm form terminals, a contact point in said circuit and forming a terminal thereof, an arm on said shaft playing over said contact point and forming the other terminal of said circuit, a notched disk borne by said contact arm, a projection on said shaft engaging the notch in said disk, a normally open electric circuit, including a generator and an electro-magnet, the armature of said electro-magnet, an arm on said shaft arranged in the path of said armature, a moving catch for preventing the full movement of said armature, and means for closing said last-named circuit whereby the signal is sounded.

In testimony that I claim the foregoing I hereunto affix my signature this 17th day of February, A. D. 1892.

WILLIAM KAISLING. [L. S.]

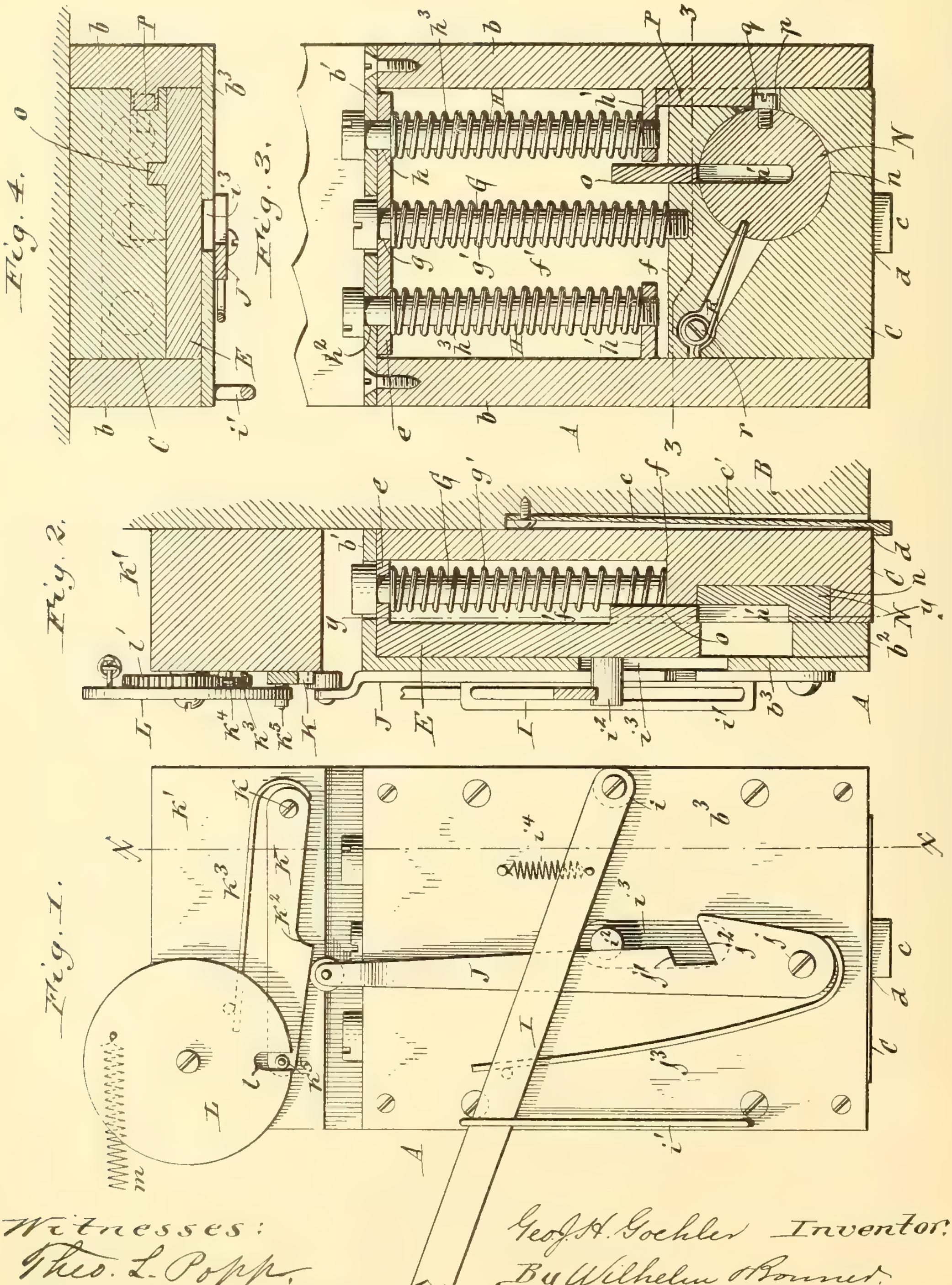
In presence of—
CHARLES LARGE,
M. E. HARRISON.

(No Model.) 2 Sheets—Sheet 1.

G. J. H. GOEHLER.

TIME LOCK.

No. 493,862. Patented Mar. 21, 1893.



Witnesses:

Theo. L. Popp.

Friedrich, Gustav, Wilhelm.

Geo. J. H. Goehler Inventor.

By Wilhelm & Bonner.

Attorneys

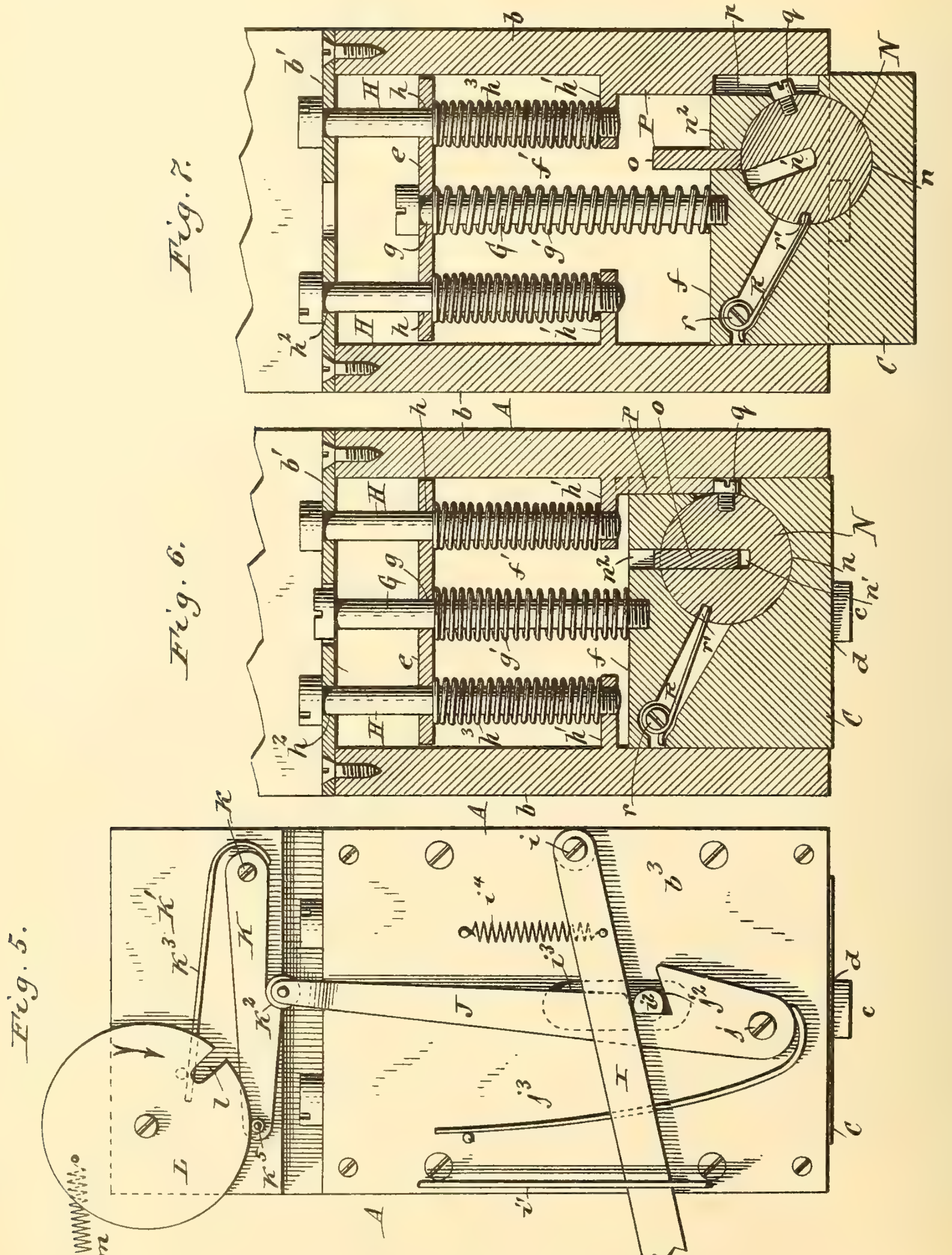
THE NORRIS PETERS CO. PHOTO-LITHO. WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

G. J. H. GOEHLER.

TIME LOCK.

No. 493,862. Patented Mar. 21, 1893.



Witnesses:
Theo. L. Popp.
Friedrich, Gustav, Wilhelm.

George J. H. Goehler Inventor.
By Wilhelm Bonner
Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE J. H. GOEHLER, OF BUFFALO, NEW YORK, ASSIGNOR TO THE CARY SAFE COMPANY, LIMITED, OF SAME PLACE.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 493,862, dated March 21, 1893.

Application filed June 20, 1892. Serial No. 437,316. (No model.)

To all whom it may concern:

Be it known that I, GEORGE J. H. GOEHLER, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Time-Locks, of which the following is a specification.

This invention relates to time locks for safes and vaults, and has the object to provide the bolt with a safety locking mechanism which prevents the bolt from being moved inwardly and unlocked by a force externally applied.

In the accompanying drawings consisting of two sheets:—Figure 1 is a front elevation of a time lock provided with my improvements, showing the position of the parts when the bolt is unlocked. Fig. 2 is a longitudinal vertical section of the same, in line x—x, Fig. 1. Fig. 3 is a vertical section at right angles to Fig. 2, in line y—y, in said figure. Fig. 4 is a horizontal section in line z—z, Fig. 3. Fig. 5 is a front elevation of the lock, showing the position of the parts when the bolt is set, preparatory to locking the same. Fig. 6 is a sectional elevation, showing the parts in the same position with the bolt set. Fig. 7 is a similar view, showing the position of the parts when the bolt is shot or locked.

Like letters of reference refer to like parts in the several figures.

A represents the inclosing case of the lock, which is secured to the frame B of the safe or vault in any suitable manner. This case is composed of side walls b b, upper and lower end walls b' b^2, and a cover b^3 forming the front side of the case, the rear side of the case being closed by the safe-frame to which it is secured.

C represents the vertical bolt whereby the safe is locked and unlocked, and which is arranged in the case with its back resting against the frame of the safe, while its lower end passes through an opening in the lower end wall b^2.

c represents the usual spring catch whereby the bolt is prevented from moving out when the safe door is open. This catch is secured with its upper end in a recess c' in rear of the bolt and provided at its lower end with a shoulder d which engages with the outer end of the bolt when the latter is in its normal or retracted position.

E represents the vertically movable draw plate which is yieldingly connected with the bolt by a tension mechanism, which is strained by depressing the draw plate for automatically locking and unlocking the bolt. The draw plate is provided at its upper end with a horizontal flange e projecting rearwardly. The upper front portion of the bolt is cut out, forming a shoulder f on the bolt and a recess f' in the case above the shoulder f.

G represents a central vertical guide rod secured with its lower end to the shoulder of the bolt, while its upper portion passes loosely through an opening g in the flange of the draw plate and is provided with a head bearing against the upper side of said flange.

g' represents a spiral spring whereby the bolt is shot or locked and which surrounds the central guide rod G and bears with its ends against the flange of the draw plate and the shoulder of the bolt.

H represents vertical rods which pass loosely through openings h in the flange e on opposite sides of the central guide rod G, and which are secured with their lower ends to lugs h' on the inner sides of the case, while their upper ends pass through openings h^2 in the upper end wall and are provided with heads bearing upon the upper end wall.

h^3 represents the springs whereby the bolt is retracted or unlocked and which surround the guide rods H and bear with their ends against the lugs h' and the underside of the flange e.

I represents a hand lever whereby the draw plate is depressed and the springs g' and h^3 are strained. This lever is arranged transversely across the front of the case and pivoted at one end by a screw i, while its opposite end passes through a vertical guide loop i'. The draw plate is provided with a pin i^2 which projects through a vertical slot i^3, in the front wall of the case underneath the hand lever, so that upon depressing the hand lever, the latter will bear upon the pin i^2 and move the draw plate downwardly. The hand lever is raised by a spring i^4.

J represents the upright catch lever where-

by the draw plate is retained in its depressed position. This lever is pivoted with its lower end to the front side of the inclosing case by a screw j and provided above its pivot with a notch having a shoulder j' on its upper side and an inclined surface j^2 on its lower side. Upon depressing the draw plate, its pin i^2 strikes the inclined surface of the catch lever and throws the latter toward the pin, so that its shoulder j' engages over the pin i^2 and holds the draw plate in a depressed position.

j^3 represents a spring which tends to disengage the catch lever from the pin i^2.

K represents a horizontal trip lever whereby the catch lever is held in engagement with the pin i^2 of the draw plate. This trip lever is arranged above the catch lever and pivoted at one end by a screw k to a supporting block k' on the safe-frame. The lower side of the trip lever is provided with a shoulder k^2 which engages with the upper end of the catch lever.

k^3 represents a spring whereby the trip lever is yieldingly held in contact with the catch lever and which bears against a pin k^4 secured to the supporting block. The opposite end of the trip lever is provided with a forwardly projecting pin or roller k^5 which bears against the periphery of a trip wheel L, whereby the shoulder of the trip lever is held in engagement with the catch lever. The trip wheel is provided with a radial slot l which is adapted to register with the pin k^5 of the trip lever. The trip wheel is connected by a gear wheel l' with a clock-work of any suitable and well-known construction, whereby the trip wheel is rotated in the direction of the arrow, Fig. 5.

m represents a spring whereby the trip wheel is rotated in a direction opposite to that of the arrow in Fig. 5, when the clock and lock are set.

When it is desired to set the lock, the hand lever is moved downwardly so as to bear on the pin of the draw plate and depress the latter until the pin engages in the notch of the catch lever. When the latter engages with the pin of the draw plate, the upper end of the catch lever engages with the shoulder of the trip lever, and the trip lever in turn is held down by the trip-wheel bearing against the pin of the trip-lever, thereby holding the draw plate and the springs g' and h^3 in a depressed position, as represented in Fig. 6. When the rotation of the trip-wheel, caused by the clock-work, brings the slot of the trip-wheel in register with the pin of the trip-lever, the spring of the catch lever disengages the latter from the pin of the draw plate, which causes the upper end of the catch lever to ride over the shoulder of the trip-lever and raise the latter, so that its roller enters the slot of the trip-wheel, which permits the spring g' to raise the draw plate and the bolt, thereby unlocking the safe, as represented in Figs. 2 and 3.

A forcible entrance into the safe has been effected by discharging an explosive in front of the bolt, which forced the latter inwardly against the pressure of the spring g' and unlocked the bolt.

In order to prevent the bolt from being moved inwardly or unlocked by an external force, a safety locking mechanism is provided which is constructed and arranged as follows:—N represents a tumbler disk which is arranged in a correspondingly-shaped socket n formed in the front side of the bolt below its shoulder. This disk is provided on its front or outer side with a groove n' extending radially from the periphery toward the central portion of the disk. This groove stands vertically when the disk is in its normal position and registers with a vertical groove n^2 formed in the front side of the bolt and extending from the shoulder of the bolt to the tumbler disk. o represents an abutment or projection formed vertically on the rear side of the draw plate and arranged in the front groove n^2 of the bolt when the latter is in a normal or raised position. When the tumbler disk is turned so that its groove is in line with the front groove n^2 of the bolt, it permits the abutment o to enter the groove of the disk, so that the draw plate and bolt can move lengthwise upon each other. When the tumbler disk is turned so that its groove is out of line with the front groove of the bolt, the abutment engages against the periphery of the tumbler disk and thereby locks the bolt and draw plate together and prevents one from moving lengthwise upon the other. P represents a stop which shifts the tumbler disk to the position in which its groove is in line with the abutment. This stop is formed on the inner side of the side wall b' of the case and is arranged at the inner end of a recess p formed in the side of the bolt adjacent to the stop and extending inwardly to the periphery of the tumber disk. q represents a screw or projection which is secured to the periphery of the tumbler disk and projects into the recess p, so that when the bolt is retracted the last portion of its backward movement causes the projection q of the tumbler to strike the stop P and turn the tumbler sufficiently to bring its groove in line with the abutment. R represents a spring whereby the tumbler disk is turned to the position in which its groove is out of register with the abutment. This spring is secured by a screw r in a recess formed in the front side of the bolt on one side of the disk and engages with its ends against the bolt and a notch r' formed in the periphery of the disk. In the normal or retracted position of the bolt, the stop P holds the disk in the position in which its groove is in line with the abutment. Upon moving the draw plate downwardly to strain the springs g' and h^3, the abutment enters the groove in the disk, but the bolt is held against outward movement by the catch c, as represented in Figs. 2 and 3. When the door of the safe is closed the catch is released from the bolt,

which permits the latter to be shot or moved out by the expansion of the spring g'. The outward movement of the bolt removes the projection q of the tumbler disk from the stop P. At the end of the outward movement of the bolt, the abutment is wholly removed from the groove of the tumbler disk, whereby the latter is released and permitted to be turned by the spring R into the position represented in Fig. 7, in which the slots are out of register. The bolt is now prevented from being moved backward, because the solid portion of the periphery of the tumbler disk bears against the abutment of the draw plate and the draw plate itself is held against backward movement by the clock tripping mechanism. The draw plate and bolt are, therefore, locked together, which effectually prevents the latter from being moved backward by an external force. When the clock releases the tripping mechanism, the bolt and draw plate are drawn back together by the springs h^3, and during the last portion of the backward movement, the projection q of the tumbler disk strikes the stop P and turns the disk into the position in which its groove registers with the abutment of the draw plate, preparatory to again setting the lock.

I claim as my invention—

1. The combination with the locking bolt and the movable draw plate yieldingly connected with the bolt, of a safety locking mechanism connected with the bolt, whereby the bolt is locked against movement on the draw plate by a force externally applied, substantially as set forth.

2. The combination with the locking bolt and the movable draw plate yieldingly connected with the bolt, of a tumbler arranged upon the bolt and adapted to lock the bolt against movement upon the draw plate, substantially as set forth.

3. The combination with the locking bolt and the movable draw plate yieldingly connected with the bolt, of a movable tumbler arranged upon the bolt and provided with a groove, and an abutment formed on the draw plate and adapted to engage either in the groove or against the edge of the tumbler, substantially as set forth.

4. The combination with the locking bolt, and the movable draw plate yieldingly connected with the bolt, of a safety tumbler arranged upon the bolt, and a spring and a stop whereby the tumbler is shifted in opposite directions, substantially as set forth.

5. The combination with the inclosing case, the locking bolt and the movable draw plate yieldingly connected with the bolt, of an oscillating tumbler disk arranged upon the bolt and provided with a groove extending from its periphery inwardly, an abutment formed on the draw plate, a spring whereby the tumbler disk is turned to bring its groove in line with the abutment, and a stop formed on the inclosing case and adapted to engage with the tumbler disk and shift the latter to bring its groove out of line with said abutment, substantially as set forth.

Witness my hand this 13th day of June, 1892.

GEORGE J. H. GOEHLER.

Witnesses:
THEO. L. POPP,
FRED C. GEYER.

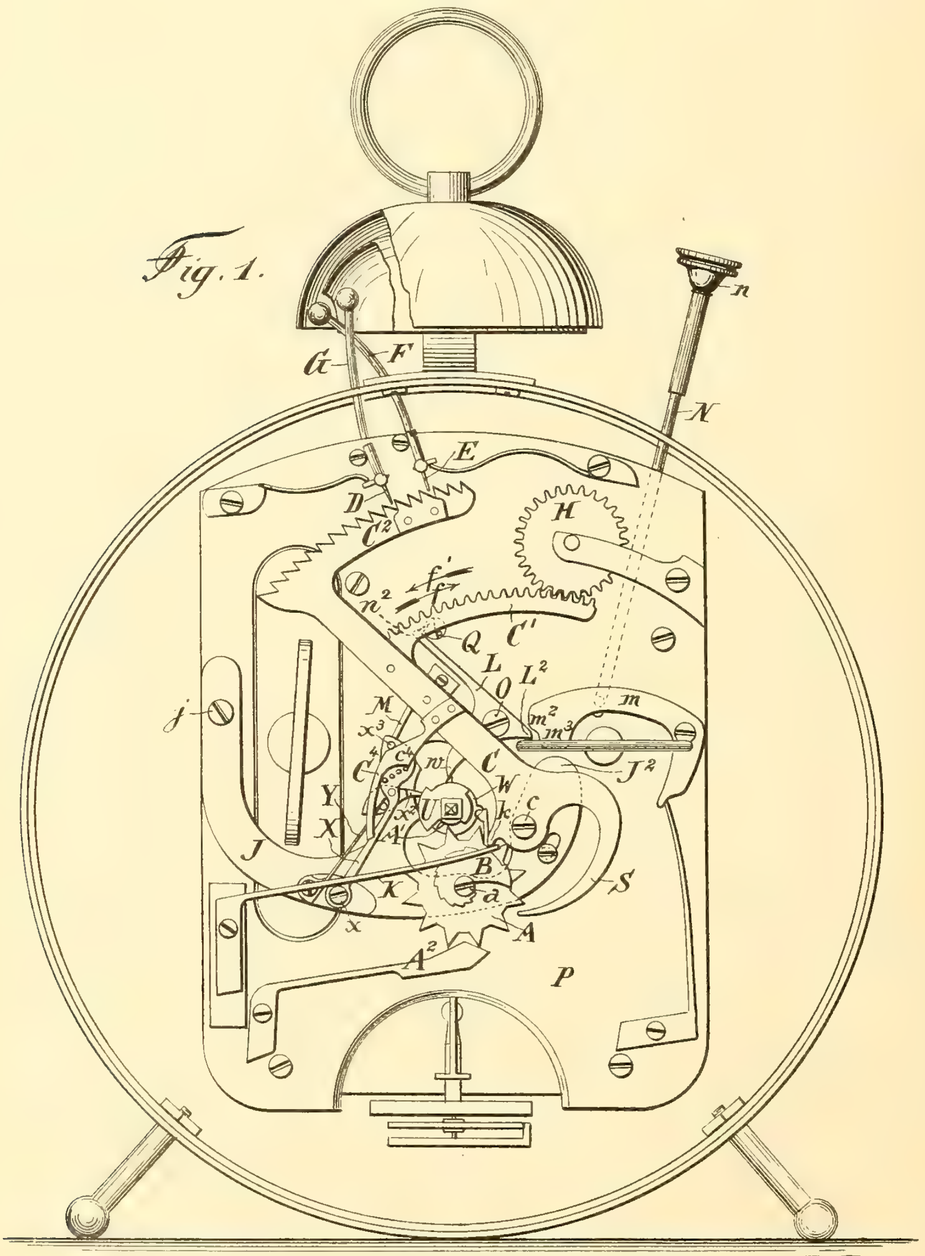
(No Model.) 4 Sheets—Sheet 1.

H. AUDEMARS & H. SANDOZ-SANDOZ.

REPEATING MECHANISM FOR TIMEPIECES.

No. 494,727. Patented Apr. 4, 1893.

Fig. 1.



Witnesses
Chas H. Smith,
J Staib

Inventors
Henri Audemars
Henri Sandoz-Sandoz
per Lemuel W. Serrell
Atty.

(No Model.) 4 Sheets—Sheet 2.

H. AUDEMARS & H. SANDOZ-SANDOZ.

REPEATING MECHANISM FOR TIMEPIECES.

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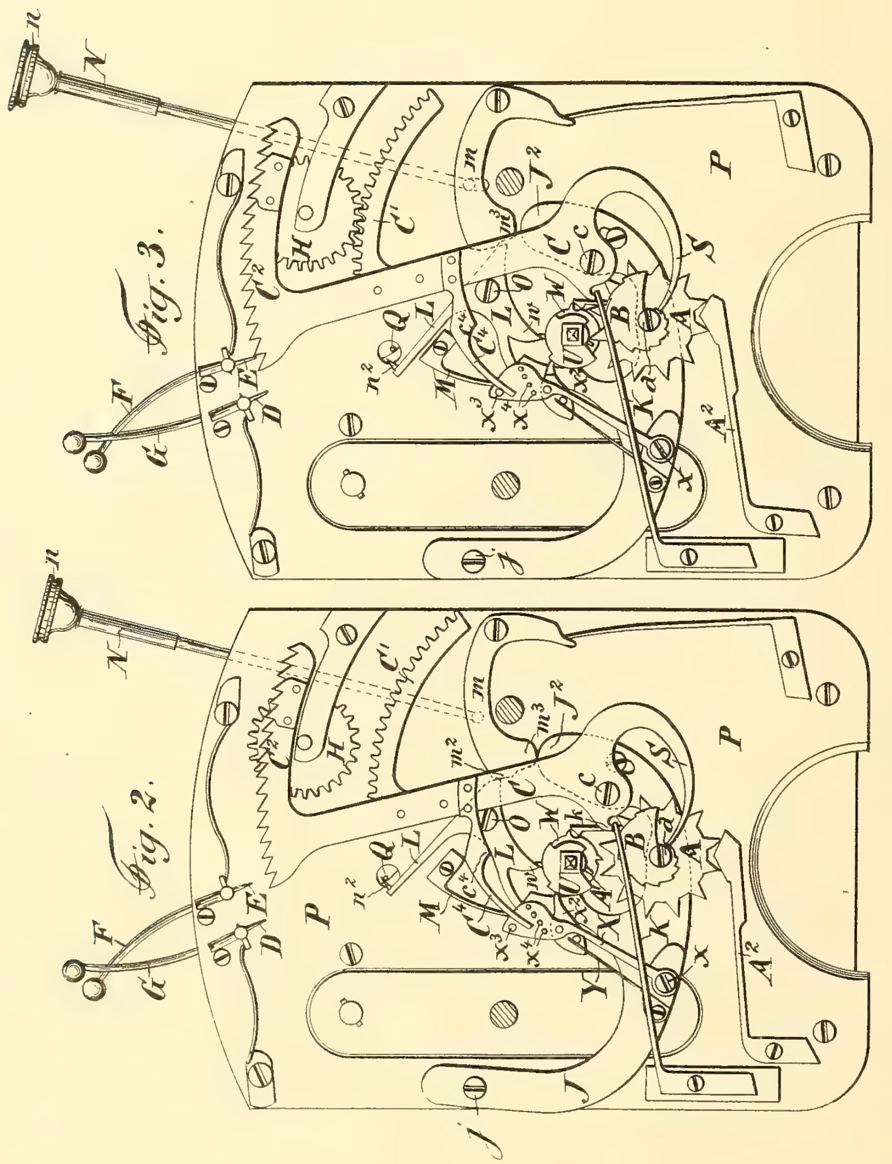

Witnesses
Chas H. Smith
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(No Model.) 4 Sheets—Sheet 3.

H. AUDEMARS & H. SANDOZ-SANDOZ.

REPEATING MECHANISM FOR TIMEPIECES.

No. 494,727. Patented Apr. 4, 1893.

Fig. 4.

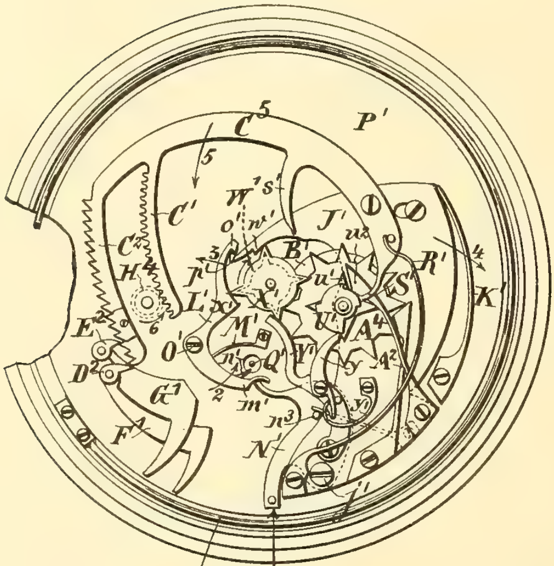
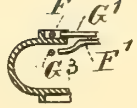


Fig. 8.



Witnesses
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(No Model.) 4 Sheets—Sheet 4.

H. AUDEMARS & H. SANDOZ-SANDOZ.

REPEATING MECHANISM FOR TIMEPIECES.

No. 494,727. Patented Apr. 4, 1893.

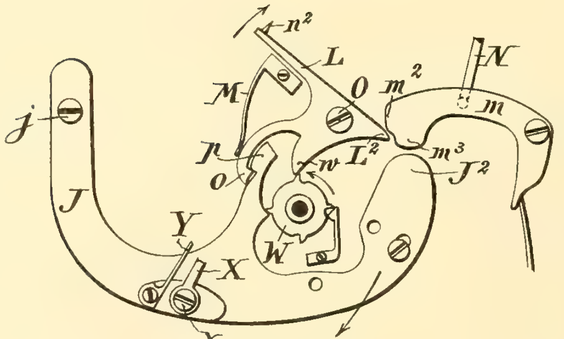


Fig. 5.

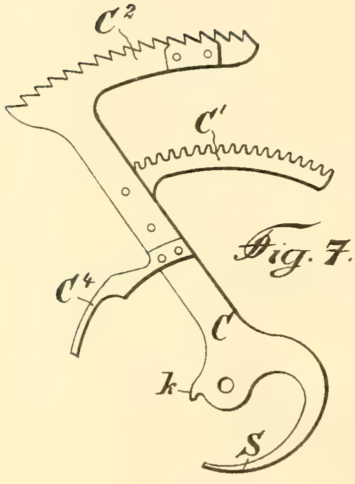


Fig. 7.

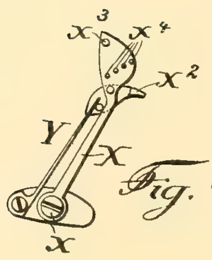


Fig. 6.

Witnesses
Chas H. Smith
J. Staib

Inventors
Henri Audemars
Henri Sandoz-Sandoz
per Lemuel W. Serrell
Atty.

UNITED STATES PATENT OFFICE.

HENRI AUDEMARS AND HENRI SANDOZ-SANDOZ, OF TARANNES, SWITZERLAND.

REPEATING MECHANISM FOR TIMEPIECES.

SPECIFICATION forming part of Letters Patent No. 494,727, dated April 4, 1893.

Application filed October 17, 1892. Serial No. 449,055. (No model.)

To all whom it may concern:

Be it known that we, HENRI AUDEMARS and HENRI SANDOZ-SANDOZ, Swiss citizens, residing at Tarannes, Switzerland, have invented a new and useful Repeating Mechanism for Timepieces, of which the following is a specification.

The invention consists of an improved mechanism for sounding the hours, quarters and minutes in watches or clocks, the motive power producing said sounding being of any desired character (generally a mainspring) and the said mechanism being put into action either automatically each hour, quarter or every five minutes, or caused to repeat when one acts upon a suitable lever or pusher provided for that purpose.

In the accompanying drawings, Figures 1, 2 and 3 are elevations showing the invention applied to a clock and Fig. 4 is an elevation showing the same at an exaggerated scale applied to a watch. Fig. 5 shows separately the rocking-levers J m and L. Fig. 6 represents the lever X, its arm x^2 and spring Y. Fig. 7 shows separately the rocking piece C with its racks C′ and C^2 and arm C^4. Fig. 8 is a section showing the sounding springs.

In all the figures the same letters refer to the same parts.

A is the hours star wheel and B the hours step cam or staff fixed to the wheel.

A′ is a cam or finger fixed to the minute wheel of the clock and causing at each revolution of the same the star wheel A to be moved one tooth.

A^2 is a brake spring preventing the jumping of more than one tooth of the star wheel A at a time and u^2 is a brake spring preventing the jumping of more than one tooth at a time of the star wheel u' of the watch shown in Fig. 4.

C is a rocking lever pivoted at c to a movable piece. In the mechanism shown in the drawings it is formed of a rocking piece J pivoted at j to the plate of the work.

The rocking lever C is provided with two racks or segmental racks C′ and C^2 the first one being provided with teeth to be acted upon by a driving pinion H, rotated by the motor of the watch or clock, and the rack C^2 being provided with teeth to act upon the levers E and D of the hammers F and G to cause the hours, quarters and minutes to be sounded.

The purpose of the just described construction, and especially of the pivot c of the lever C being upon a rocking lever, is to allow the racks or toothed segments C′ and C^2 to be temporarily thrown out of reach, the one of the pinion H and the other of the hammer levers D and E. This is necessary to be done at the moment in which the sounding or repeating is acted upon, that is to say at the moment in which the rack C^2 is thrown into position corresponding to the time marked by the watch or clock, the said position being determined as usual by means of a suitable step cam B for the hours and U for the quarters.

In the construction shown in Figs. 1, 2 and 3, a spring K fixed to the plate P bears against a projection k of the lever C which is pivoted at c to the rocking piece J as specified above. The said spring K therefore tends to cause the lever C to move to the right, and in the direction of the arrow f in Fig. 1, and the rocking piece J is raised into its upper position, Fig. 1, in which the rack C is driven by the pinion H and the rack C^2 actuates the hammer levers D and E. The said rocking piece J is held when the sounding work is at rest, in one position, by means of a rocking piece L pivoted at O to the movement plate and provided with a clasp, o into which is hooked a clasp p of the rocking piece J. The rocking piece L is acted upon by a suitable spring M which tends to press the same into the position shown in Figs. 1 and 5 in which the clasp p of the rocking piece J is hooked to the clasp o of the rocking piece L. There is provided a lever m to which is connected a pusher N having a button or knob n intended to be depressed when the clock is to be caused to sound the hours. Said lever m when out of action bears neither against the rocking piece L nor against the rocking piece J, but it is intended to act upon both of them when the pusher N is depressed. The projection m^2 of the lever m meets then first the projection L^2 of the piece L and causes this latter to oscillate into the position shown in Fig. 2, in which the hook p of the piece J is no longer engaged with the hook o of the piece L. Said piece L is further

provided with a hook or projection n^2 intended to stop the sounding mechanism during the time the toothed segment C′ is out of gear of the pinion H, by catching the pin Q fixed to the escapement anchor piece of said mechanism. Then the projection m^3 of the lever m meets the end J^2 of the piece J and depresses the same, thus causing the toothed segment C′ to be moved away from the pinion H and the rack C^2 from the levers D and E. The rack teeth C′ getting out of reach of the pinion H, the lever C will be rocked by its spring K until the projection or finger S of said lever C meets the snail or step cam U marking the hours. According to the position in which said step cam is at that moment, so the rack C^2 will cause more or less hour strokes to be struck when the pusher is abandoned to itself and the rocking piece J lifted by the spring K. The point n^2 of the piece L then leaves the pin Q to itself so that the striking mechanism revolves and the pinion H will cause the lever C to be rocked in the direction of the arrow f' of Fig. 1, and to strike the hours, quarters and minutes until the said lever meets the device hereinafter described.

The stopping of the lever C is effected by means of a lever X Fig. 6, pivoted at x to the rocking piece J, and caused to move with its small arm x^2 toward and against the quarters snail U, Fig. 3. This lever X carries a pin x^3 which does not hinder the movement of the lever X toward the snail U when the lever C is out of action, that is to say, in the position of Fig. 2, but which meets the inclined plane, and then the arched portion of the arm C^4 of said lever C, when the same is moved from the position of Fig. 1 to that of Fig. 2 by the sounding mechanism being started. The meeting of the pin x^3 and of the arm C^4 causes the lever X and its arm x^2 to be raised out of reach of the snail U; but as soon as the lever C has accomplished the necessary motion for the sounding of the hours, and when the toothed segment C^2 is about to begin the sounding of the quarters, the pin x^3 is in front of the inclined plane of the arm C^4 and the lever X moves freely to the snail U by the spring Y. Now said lever X carries four pins x^4 so arranged, that according to the position given to the lever X by the snail U the heel c^4 of the arm C^4 meets the pin which stops said lever C in the position required by the toothed segment C^2 for striking the number of quarters (0, 1, 2 or 3) corresponding to the position in which the staff U is placed at that time. The before described function, that is to say, the unhooking of the sounding mechanism by the action of the pusher N, may also be automatically produced by the watchwork by means of a star wheel W, fixed upon the minute wheel and acting upon the projection w of the rocking piece L, as indicated in Fig. 5, to move the same and separate the clasp o from p.

In the construction shown in Fig. 4 the quarters snail U′ m the star wheel A^4 and the hours snail B′ are all pivoted to one and the same axis, fixed to the rocking piece J′ pivoted at j' to the plate P′. N′ is a pushing lever pivoted to the screw j' and provided with a pin n^3 which imparts the motion of the pushing lever N′ to the rocking piece J′ when said pusher is moved in the direction shown by an arrow 1. The rocking piece is generally maintained in its position of rest shown in Fig. 4 by means of its projection p' being hooked to the tooth o' of a rocking lever L′ pivoted at O′ to the plate. Said rocking lever L′ has an arm m' which is acted upon by the pushing lever N′ and a hook n' is provided to stop the escapement of the sounding mechanism by catching the pin Q′ fixed to the anchor of the same. A spring K′ tends to maintain the mechanism in the position shown in the drawings in which its tooth p' engages with the tooth o' of the rocking lever L′, but if one depresses the lever N′ in the direction of the arrow 1, the rocking piece L′ is rocked in the direction of the arrows 2 and 3, thus causing the tooth p' to be disengaged from the tooth o' and the piece J′ to be rocked in the direction of the arrow 4, that is to say, in such a manner as to displace the piece C^5 in disconnecting the teeth C′ from the pinion H^4 and the rack C^2 from the hammer levers D^2 and E^2, the said piece C^5 being then free to be rocked by the spring R′ in the direction of the arrow 5 until its arm s' meets one of the steps of the hour snail B′. The above described rocking of the piece L′ causes, together with the described unlocking of the rocking piece J′, the stopping of the escapement of the sounding mechanism by means of a hook n' engaging with the pin Q′, so that the motor of the sounding mechanism is stopped until the rocking lever L′ is thrown back into its first position by means of the spring M′. When the pushing lever N′ is abandoned to itself, the piece J′ is rocked inversely to the direction of the arrow 4, and the toothed segment C′ is again put into gear with the pinion H^4 and the hammer levers D^2 and E^2 with those of its teeth C^2 determined by the position in which the lever C^5 has been stopped by the hours staff B′ in its above described movement. The pin Q′ having been abandoned by the hook n' the motive pinion H will then begin to rotate in the direction of the arrow 6, causing the sounding of the hours and quarters which is stopped as soon as the projection S′ of the lever C^5 meets the quarters snail U′.

The star wheel A^4 is caused to revolve by means of a suitable finger or pin fixed to the minute wheel, said finger or pin causing the wheel A^4 to be moved one of its teeth at each revolution of the minutes wheel. The star wheel X′ is intended to lift and again abandon to itself every quarter of an hour a lever Y′ having a click y and spring y'; the said click y causes the star wheel u' to which is fixed the quarters snail U′ to be rotated tooth by

tooth. A star wheel W′ fixed to the minute wheel of the watch work causes the automatic sounding of the hours when its teeth meet with the points w' and x' of the pieces J′ and L′. The sounding springs F^3 and G^3 of the improved watch are arranged inside of the watch case ring as shown in the partial section in Fig. 8 and are struck by the hammers F′ G′.

Either in the described watch or in the described clock one may combine the teeth of the sounding rack so as to have the quarters struck before or after the hours. The said teeth range may also be combined so as to strike the quarters and the minutes before or after striking the hours. The snails may further be constructed in form of a continuous volute cam, instead of being provided with steps in view of facilitating the automatic sounding of the hours, or five minutes.

We claim as our invention—

1. The combination with the sounding mechanism and a rotating wheel or pinion, of the rocking lever having a toothed segment, the rocking piece to which the rocking lever is pivoted, hooks to hold the parts in their normal position, mechanism for disconnecting the hooks and separating the toothed segment and wheel and allowing the spring of the rocking lever to move the same, a snail for arresting the movement, and a rack and sounding mechanism actuated by the rocking lever as it is moved to its normal position by the gear or pinion acting on the tooth segment, substantially as specified.

2. The combination with the sounding mechanism and a rotating wheel or pinion, of the rocking lever having a toothed segment, the rocking piece to which the rocking lever is pivoted, hooks to hold the parts in their normal position, automatic starting mechanism for disconnecting the hooks and separating the toothed segment and wheel and allowing the spring of the rocking lever to move the same, a snail for arresting the movement, and a rack and sounding mechanism actuated by the rocking lever as it is moved to its normal position by the gear or pinion on the tooth segment, substantially as specified.

3. The combination with the sounding mechanism and a rotating wheel or pinion, of a rocking lever having a toothed segment engaging such wheel or pinion, a rocking piece to which the rocking lever is pivoted, hooks for holding the parts in their normal position, a push mechanism for disconnecting the hooks and moving the rocking piece to separate the toothed segment and wheel, and a spring to move such rocking lever and a snail for arresting the movement, and sounding mechanism for indicating the hours as the rocking lever is moved by its gear or pinion, a second snail and stop for the quarter hour signals, and means for stopping the striking train when the tooth segment is separated from the pinion and the reverse, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

HENRI AUDEMARS.
HENRI SANDOZ-SANDOZ.

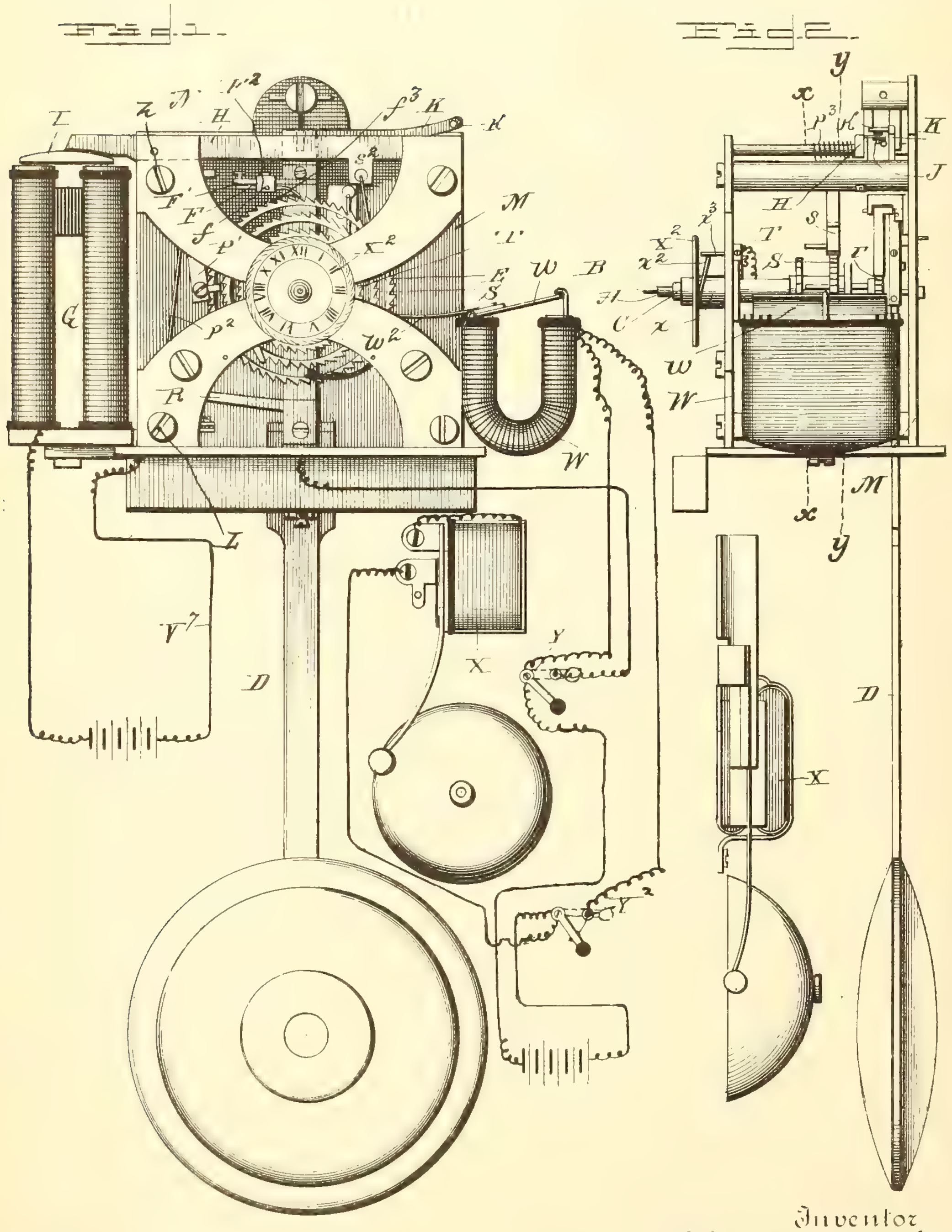
Witnesses:
JULES CHAPNY,
E. H. USCHY.

(No Model.) 4 Sheets—Sheet 1.

H. WUBBELER.

ELECTRIC CLOCK.

No. 494,832. Patented Apr. 4, 1893.



Witnesses
J. S. Burlingham
Herman J. Martin

Inventor
Herman Wubbeler

By his Attorneys
Evert & Appleman

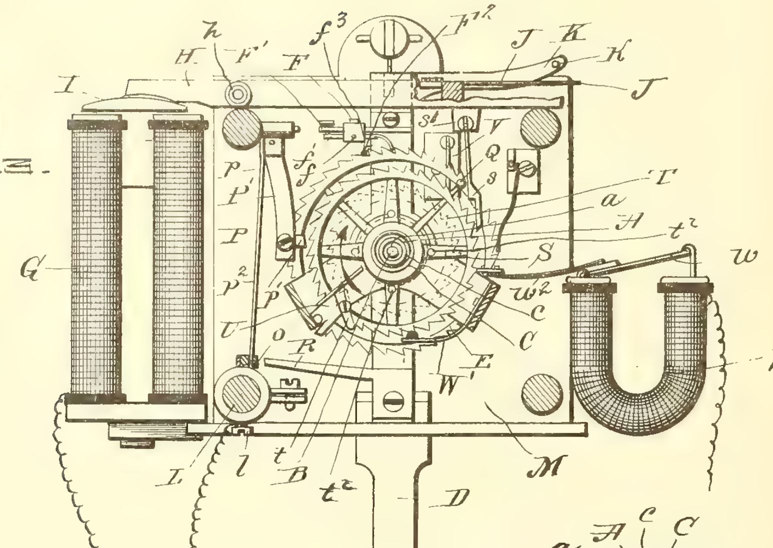
(No Model.) 4 Sheets—Sheet 2.

H. WUBBELER.

ELECTRIC CLOCK.

No. 494,832. Patented Apr. 4, 1893.

Fig. 3.



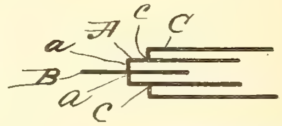


Fig. 11.

Fig. 4.

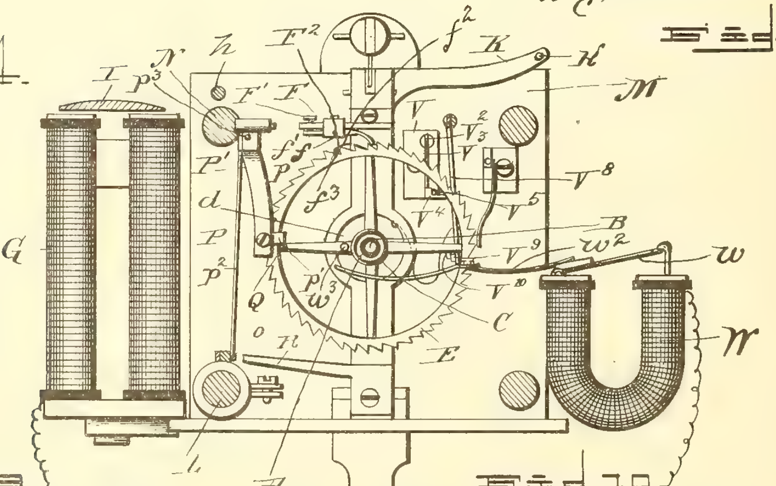


Fig. 9.

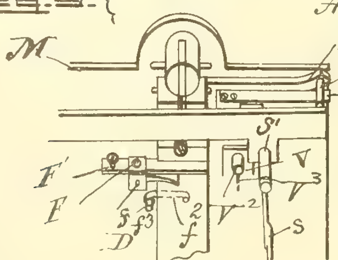
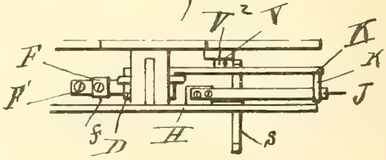


Fig. 10.



Witnesses
J. S. Burlingham
Herman J. Martin

Inventor
Herman Wubbeler
By his Attorneys
Evert & Appleman

(No Model.) 4 Sheets—Sheet 3.

H. WUBBELER.

ELECTRIC CLOCK.

No. 494,832. Patented Apr. 4, 1893.

Fig. 5.

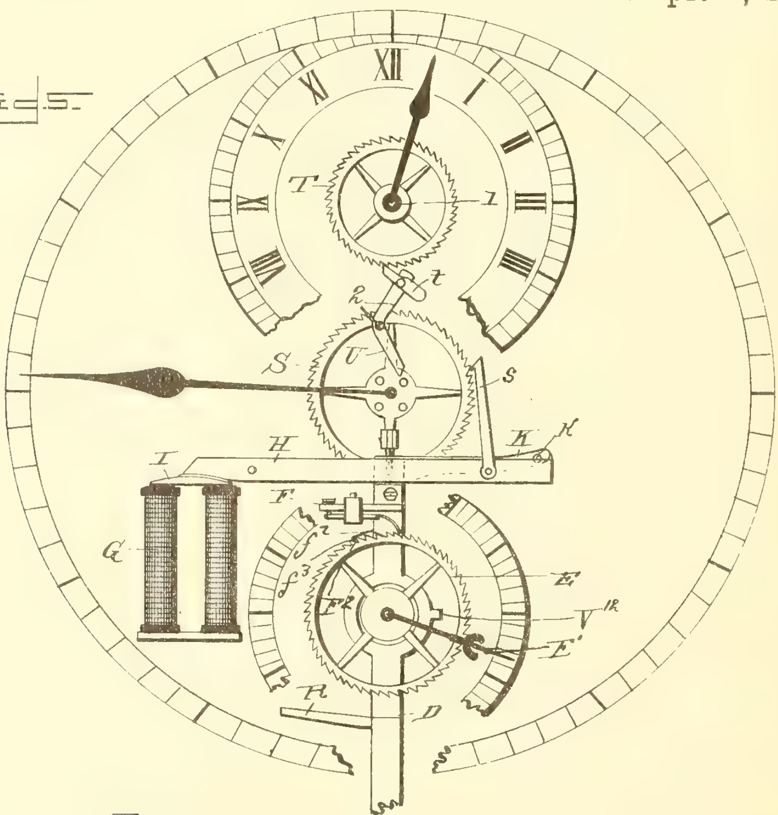


Fig. 6.

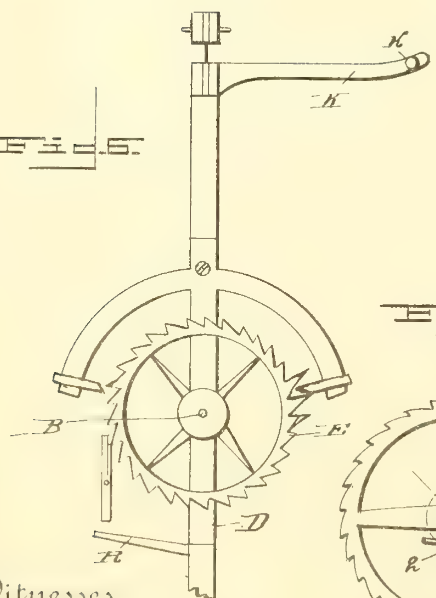


Fig. 7.

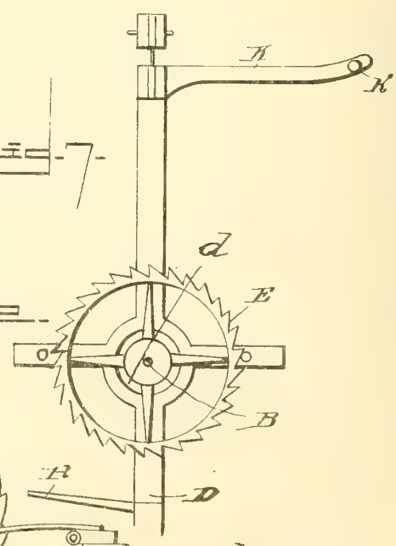
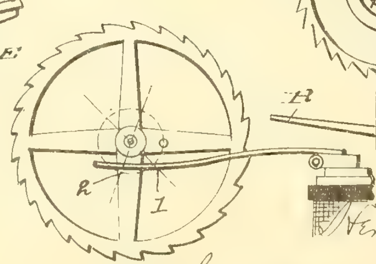


Fig. 12.



Witnesses

J. S. Burlingham

Herman J. Martin

Inventor

Herman Wubbeler

By his Attorneys

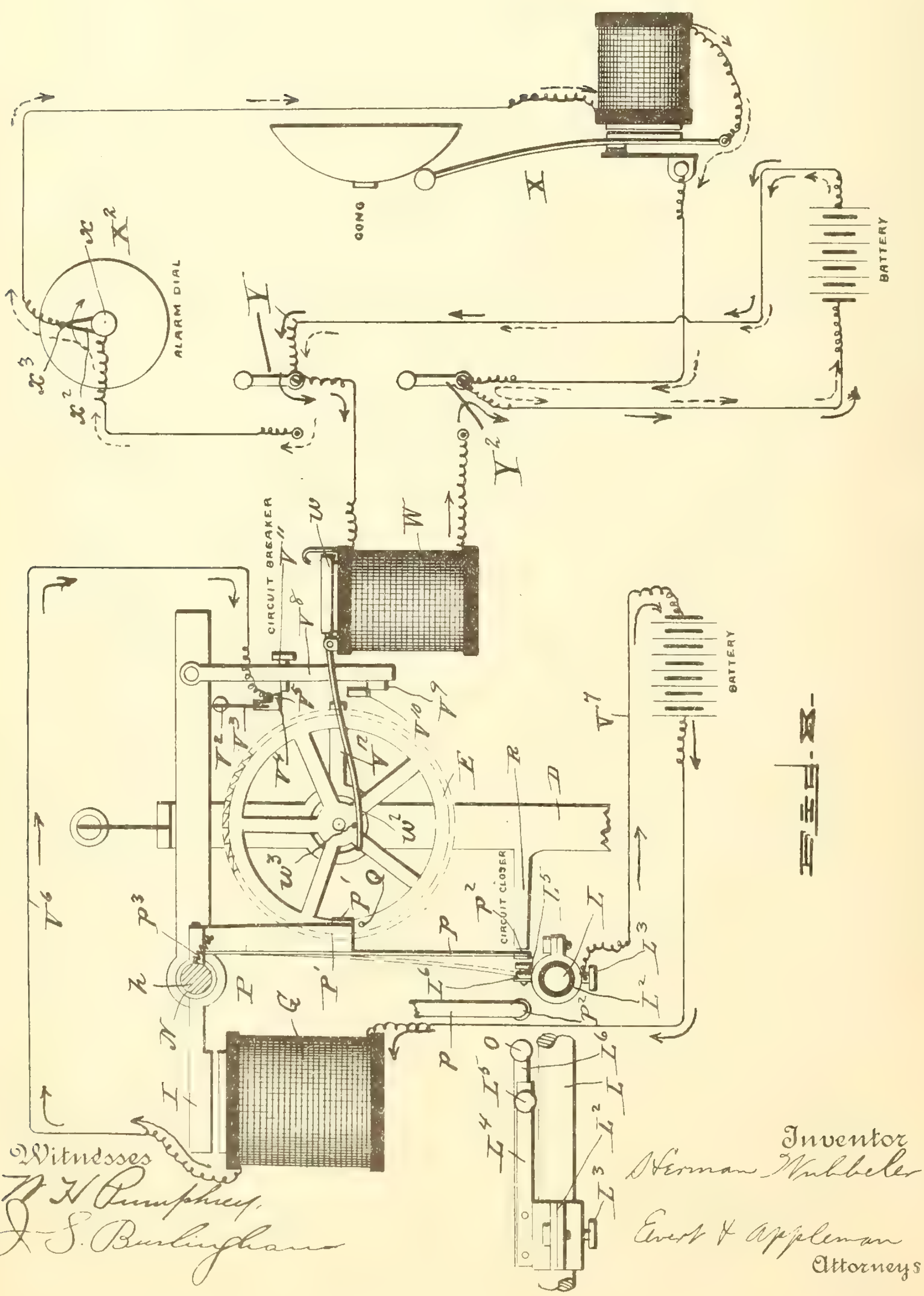
Evert & Appleman

(No Model.) 4 Sheets—Sheet 4.

H. WUBBELER.

ELECTRIC CLOCK.

No. 494,832. Patented Apr. 4, 1893.



Witnesses
N. H. Rumphrey.
J. S. Burlingham

Inventor
Herman Wubbeler
Evert & Appleman
Attorneys

UNITED STATES PATENT OFFICE.

HERMAN WUBBELER, OF BEAVER FALLS, PENNSYLVANIA.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 494,832, dated April 4, 1893.

Application filed May 21, 1892. Serial No. 433,905. (No model.)

To all whom it may concern:

Be it known that I, HERMAN WUBBELER, a citizen of the United States of America, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to an improvement in the adaptation of electricity to apply the power to drive clock work, the primary object being to provide a simple device for automatically applying the power to maintain the clock work in a constant and a continuous movement.

A further object of my invention is to produce an electric motor for the time registering machinery of clocks, in which the pendulum receives all the impulse directly and at regular intervals, and imparting no impulse except to an accurately balanced ratchet wheel which carries an indicator to register the seconds of time.

A further object of my invention is to provide a clock movement of a minimum number of parts, only one of which, namely, an accurately balanced ratchet wheel, is directly operated by the oscillation of the time measuring pendulum, and the other parts being operated directly by the electro magnet which is controlled by the pendulum.

A further object of my invention is to employ in combination with the clock movement as above set forth, an alarm mechanism arranged in a second circuit and controlled by suitable circuit closing devices actuated by the movement proper.

A further object of my invention is to employ such a novel construction and arrangement of parts whereby the clock may be automatically set, by throwing into circuit suitable mechanism.

My invention relates particularly to an electric clock in which the time measuring pendulum controls in its vibration the circuit of an electro-magnet, which in turn actuates an impelling device by which an impulse is given to the pendulum at regular intervals and its oscillating movement thus maintained for an indefinite period. The impulse is herein shown as derived from the force of a leaf spring which is carried by a pivoted arm which also supports the armature, said spring being adapted, when the circuit is complete and the armature is attracted, to bear against an arm on the pendulum, the parts of the device shown, being arranged to close the circuit at intervals of one minute. A gravity pawl which is carried by the pendulum engages a balanced ratchet and advances it to the distance of one tooth, during one complete vibration. The circuit closing device consists of a suspended arm which is normally held by the force of gravity out of contact with a contact point, and is moved into alignment with said contact point at regular intervals by a pin which is carried on the rim of the ratchet wheel. The armature lever carries a gravity pawl which engages a minutes ratchet and advances the latter the distance of one tooth at each time the circuit is closed, the act of rotating the said minutes ratchet being accomplished by the force of gravity upon the release of the armature and the return of the armature lever to its normal position, that arm of the lever which carries the said pawl being weighted or being longer than that arm which carries the armature. The hours ratchet is operated by the means of a gravity pawl carried by a pivoted arm, the free end of which is engaged by pins arranged upon the hub of the minutes ratchet, said arms being moved continuously by means of said pins which successively engage the free end.

The invention consists furthermore, in an electric clock, in combination with suitable mechanism electrically actuated for automatically setting said clock, and comprises, an electro-magnet connected in circuit with the time movement proper, or in a separate circuit; furthermore, an armature suitably pivoted and having secured thereon a spring arm adapted to be engaged by a pin on a spoke of the seconds ratchet whereby, as the said pin is rotated by the ratchet it engages and tends to depress said spring arm until the central point of the axis of the seconds ratchet is passed when, the arm being free to act imparts an impulse to said ratchet, rotating it the distance of fifteen seconds or less.

The invention consists furthermore in an electric clock as set forth, in combination with

an alarm mechanism, comprising an ordinary form of continuously ringing bell which may be, connected in circuit with the time movement or in a separate circuit, and suitably arranged switches whereby said mechanism may be thrown in or out of circuit.

The batteries which are employed in connection with my improved clock and alarm mechanism are preferably of very low potential, thereby avoiding the destructive sparking at the instant of breaking the circuit, but I employ horse-shoe magnets of large size and having a great number of coils, thereby producing the desired power to attract the armatures without the use of a strong electric current.

An important feature of my invention is the arrangement of all the ratchets upon concentric spindles, and the absence of all gearing, and a further feature of importance is the adjustment of all the pawls whereby friction with the peripheries of the ratchets is avoided during the backward movement of said pawls.

My invention is described in detail in connection with the accompanying drawings wherein similar letters and figures of reference indicate corresponding parts in the several views, in which,

Figure 1, is a front elevation of the clock and alarm mechanism, embodying my improvements. Fig. 2, is a view in side elevation of the same. Fig. 3, is a view in sectional elevation of the same on the line of $x—x$ of Fig. 2. Fig. 4, is a similar view on the line $y—y$. Fig. 5, is a view in front elevation of a modified form showing the ratchets arranged on separate spindles. Figs. 6 and 7, are detail views of modified forms in the construction of the escapements. Fig. 8, is a diagrammatic view of the circuits. Fig. 9, is a detail view in perspective showing the arrangement of the pendulum impelling mechanism, &c. Fig. 10, is a top plan view of the same. Fig. 11, is an enlarged detail sectional view, showing the bearings of the concentric spindles.

In these drawings A, represents the hollow spindle of the minutes ratchet, which is mounted at its ends in suitable bearings in the frame and is provided at one end with interior bearings a, in which the spindle B, of the seconds ratchet is mounted. The spindle B, is smaller than the bore of the spindle A, so as to come in contact with the latter only at the bearings points a. The hours ratchet spindle C, is mounted exteriorly upon the spindle A, and is provided at its extremities with bearings c, whereby the said spindles A, and C, are only in contact at these points. The pendulum D, is suspended in the usual manner and is provided with an opening d, through which the spindle B, extends whereby the pendulum is allowed to swing freely without coming in contact with said spindle. The seconds ratchet E, is secured to and carried by the spindle B, which also carries the seconds hand E′, said ratchet being provided with teeth which are adapted to engage a gravity pawl F, which is mounted upon the pendulum. This pawl is, pivoted at f and is provided with a weighted lever at its rear end f' which counterbalances the front end and rests, in its normal position on the extremity of an adjusting screw F′, whereby the front end of the pawl is held out of contact with the periphery of the ratchet and is prevented from sliding thereon as the pendulum swings toward the left. The pawl merely touches the extremity of the teeth of the ratchet.

To prevent jumping, lagging or unevenness of motion during the revolution of the seconds ratchet, a tension device F^2, is provided and consists of a pin f^3, secured at one end of the small leaf spring f^2, the latter in turn being secured to the pendulum. This pin f^3, is adapted to move in and out of the teeth of said seconds ratchet.

G, represents the electro-magnet, arranged at one side of the pendulum, and H, represents the armature lever pivoted at h, and provided at one end with the armature I, to the opposite end of the armature-lever, is attached a leaf spring J, which extends beyond the extremities of the lever and is adapted, when the circuit is closed through the magnet, to engage a lateral pin or detent k, which is carried by the arm K, secured to the upper end of the pendulum. It will be seen that by elevating or depressing the free end of the arm K, which is rigidly attached to the pendulum at its upper extremity the latter may be oscillated and therefore, when the circuit is closed, and the armature is attracted by the magnet, thereby elevating the spring J, the latter will engage the pin k, and swing the pendulum to the right, as shown in the arrow in Fig. 9.

Suitably secured on a post L, of the frame work and insulated therefrom, is a collar L^2, provided on its under side with a binding screw L^3, to which a wire from the battery is attached, and formed integral with said collar is a projecting arm L^4, running parallel with said post and provided with a set screw L^5, for the purpose of adjusting a leaf spring L^6, which is secured to said projecting arm L^4, and is provided with a contact point O.

The circuit closer P, consists of a spring arm p, which is secured at its upper end to a swinging detent P′, the latter is pivoted at its upper end to the frame work of the clock and is provided at its lower end with a beveled block p', adapted to be engaged with a pin on the seconds ratchet. The circuit closer is arranged to hang loosely from its pivotal point, in which position the bevel block is adjacent to the rim of the seconds ratchet, the latter being provided with a pin Q, which is adapted, at intervals of one minute to engage the beveled surface of the block p', and force the lower end of the circuit-closer forward in line with the pendulum. The arm p, is constructed of spring metal and is provided with

a point p^2, which is adapted to come into contact with the contact-point O. A spring p^3, connected to the upper end of the detent P′, normally holds the end of the spring arm out of alignment with the contact-point. The pendulum carries a lateral finger R, which is adapted, when the circuit-closer has been swung forward to touch the latter and cause its lower end to close the circuit by coming in contact with the point O. When the pin on the seconds ratchet releases the circuit closer the latter returns to its normal position wherein the spring arm is out of alignment with the finger. Thus the circuit is closed by the direct action of the pendulum, at the extremity of its movement to the left, and therefore as the spring J, on the extremity of the armature-lever is elevated by the action of the magnet upon the armature it engages the arm K, and gives the pendulum an impulse toward the right or in the direction as indicated by the arrow.

A plate V, secured to back plate M, is provided with a projecting stud or post V^2, the latter being slotted to secure the end of a leaf spring V^3, having secured at the lower end thereof an L-shaped contact piece V^4, which is normally in contact with a post V^5. This post is electrically connected with one end of the coil of the electro-magnet G, and the current passing through said coil enters the connecting wire V^6, and passes through said post V^5, and contact piece V^4, thence through the back plate M, to the post N, to the circuit closer P. As the pin Q, of the seconds ratchet engages the hanging detent and moves the arm p, in alignment with the contact point O, the lateral finger R, of the pendulum completes the circuit and the current passes through the spring arms p, L^6, to the collar L^2, entering the wire V^7, passes to the battery as is clearly shown in Fig. 8.

On the armature-lever is pivotally secured a depending arm or latch V^8, having formed near its lower end a lug V^9, which is adapted when the armature is attracted, and the armature lever elevated, to engage a lug V^{10}, formed on the back plate and lock said lever in an elevated position thereon, at the same time an adjustable circuit-breaker V^{11}, of the depending arm V^8, abuts against the spring arm V^3, and breaks the circuit by forcing the L-shaped contact plate V^4, out of contact with the post V^2, and as the pendulum swings toward the right, a lateral stud V^{12}, formed integral therewith releases said pivoted latch V^8, by forcing it away from the lug V^{10}, thereby allowing the armature-lever to which said arm V^8, is pivoted, to resume its normal position; furthermore, by this movement, the pieces V^3, and V^5, are automatically brought into contact and the circuit again closed. Thus it will at once be seen, that as the pin Q, engages the beveled block of the swinging detent P′, the lateral finger R, of the pendulum closes the circuit, the electro-magnet is energized and the armature attracted. As the armature is drawn toward the magnet, the armature-lever will be elevated carrying with it the pawl of the minutes ratchet and the depending arm or latch of the circuit breaker as above stated. After the lug V^9 of the depending arm engages the lug V^{10} on the back plate the armature lever will be retained in an elevated position during the time that the pendulum is moving from the extremity of its movement to the left to the extremity of its movement to the right and at the latter point the circuit-breaker V^{11} of the depending arm, will break the circuit thereby disengaging the latch, and the finger V^{12}, disengaging said depending arm or latch from the lug allows the several parts to fall by gravity into their normal position, which movement actuates the pawl of the minutes ratchet to rotate the same the distance of one tooth. In as much as the circuit is not closed until the pendulum reaches the extremity of its movement to the left, it will be evident that the period of vibration of the pendulum is not shortened by the impulse which it secured from the movement of the armature-lever. The armature-lever does not move until the pendulum has reached the limit of its movement in one direction and is ready to travel in the opposite direction. The impulse is given in the direction of the movement of the pendulum and not in opposition to the same at any point, and therefore the period of vibration remains the same perpetually.

From the above it will be seen that the pendulum receives an impulse at the end of each complete rotation of the seconds wheel or once every minute, the said rotation being controlled, directly, by the oscillation of the pendulum, and the minutes ratchet S, is engaged by a pawl s, which is pivoted to the armature lever, or to a short depending lug s', whereby as the armature lever is elevated at its free end by the attraction of the armature, the said pawl engages a successive tooth of the minutes ratchet, and when the armature is released the free end of the lever descends by its own weight and causes the minutes ratchet to rotate the distance of one tooth. It will be seen that the minutes ratchet is not rotated by the direct action of the magnet upon the armature, but by the return of the lever to its normal position after being released by the magnet, also that the arm of the lever to which the pawl S, is attached, is longer than the arm to which the armature is attached whereby the weight of the former is sufficient to rotate the minutes ratchet.

The hours ratchet T, is operated by means of a gravity pawl t, which is carried by a pivoted arm U, the upper free end of which is engaged by the lateral pins, t^2 on the hub of the minutes-ratchet. Four of these pins are shown in the drawings, and the arm U, is arranged so as to be engaged thereby, successively; as the end of the arm is released by one of the pins it falls, by gravity, against the succeeding pin, which in turn moves its

free end in the direction indicated by the arrow in Fig. 3, thereby causing the hours ratchet to rotate in the same direction. A greater or less number of these pins may be employed to suit the requirements of particular cases,

It will be seen that the minutes ratchet is operated at intervals of one minute, by the operation of the armature-lever, and the hours ratchet, which depends for its operation upon the minutes ratchet, rotates continuously, or advances a portion of the distance necessary to indicate a lapse of an hour, each time the minutes ratchet moves. A locking pawl W′, is also provided with the minutes ratchet, to prevent backward movement of the latter.

The mechanism for setting the clock, comprises the electro-magnet W, suitably supported on the frame work and provided with a hinged armature w, having a spring arm w^2, which latter is adapted to be engaged by a pin or stud w^3, of the seconds ratchet (see Fig. 4) when the said magnet is in circuit. Thus, assuming that the switch Y^2, is in the position as shown in dotted lines Fig. 1, the magnet W, would be energized, the armature w, attracted and the spring arm w^2, elevated to a position where it would be engaged by the pin w^3, on the rotation of the seconds-ratchet. When this pin has reached a point 1, (Fig. 12) in its circular path of travel, such an engagement occurs and the said spring arm is gradually depressed and tensioned until a point 2, is passed and being free to act, it will spring upwardly and drive the seconds ratchet forward a predetermined distance at an accelerated speed. It being understood that the operation of this device in no way interferes with that of the movement proper, also that by retaining the switch in such a position, whereby an engagement is effected as described during each revolution of the seconds ratchet, the seconds, minutes and hours hands may be adjusted as desired.

The alarm mechanism consists of the ordinary form of continuous sounding bell, which may be electrically connected in circuit with the time movement or in a separate circuit. The latter method being here illustrated, wherein the alarm X^2, dial is provided with a collar x, adapted to fit loosely over the projecting spindle of the hours ratchet see Fig. 2 and turn with it, said collar having secured thereon a contact piece x^2, forming one terminal of the alarm circuit and designed to engage a second contact piece or the other terminal x^3, which is insulated from the movement, and constructed in the form of a stud or projecting wire which stands normally in the path of the contact piece x^2, whereby as the hours ratchet spindle revolves the pieces x^2, x^3, are brought into contact, thus making the circuit.

A switch Y, is provided for the purpose of throwing the alarm mechanism in or out of circuit and Y^2, represents a second switch controlling the operation of the clock setting device.

In Fig. 5, a modified form of arranging several ratchets and their respective pawls is shown, wherein the hours ratchet is mounted on a spindle as at 1, and the gravity pawl engaging said ratchet is suitably mounted on a shaft 2. The minutes ratchet being mounted directly below the hours ratchet and provided pins (four in number) which are adapted to engage the lower end of the arm carrying a gravity pawl (as shown) once ever quarter revolution. The seconds ratchet being constructed and arranged substantially as in Fig. 1, with the magnet armature and lever, gravity pawl and pendulum corresponding, the operation will at once be understood.

Fig. 7 illustrates the ordinary form of escapement slightly modified to replace the gravity pawl wherein the pendulum is provided with engaging arms to rotate the seconds ratchet.

The operation of my improved clock mechanism is briefly as follows: The pendulum is suspended loosely, and moves freely in the rear end of the seconds ratchet, the latter being accurately balanced so as to require but a slight touch to turn it upon its pivot, the object being to allow the pendulum to oscillate with as little opposition and friction as possible. The seconds ratchet is provided with teeth, and is advanced the length of one tooth by each vibration of the pendulum. At intervals of one minute the pin which is carried by the seconds ratchet engages the circuit closer and swings the lower end of the latter forwardly until it is in alignment with the contact point and the finger R, on the pendulum. As the pendulum reaches the extremity of its movement to the left, the finger R, touches the spring arm and closes the circuit, the spring which forms the lower portion of said spring arm being so delicate as to require a mere touch to cause the bar p^2, to bear against the contact point. The circuit being closed, the armature is attracted thereby elevating the impulse spring J, which engages the operating arm K, and gives the pendulum an impulse to the right. As the longer arm of the armature lever rises, the pivoted latch engages its supporting pin thereby maintaining the impulse spring in contact with the operating arm throughout the swing of the pendulum toward the right, said latch being disengaged at the extremity of said movement to the right by the lateral detent. As the longer arm of the armature descends by its own weight after being released by the disengagement of the latch, the minutes ratchet is rotated the distance of one tooth, and the successive advances of the minutes ratchet, acting through the pins upon the hub of the latter and the pivoted arm U, causes the hours ratchet to rotate as described. It will be noted that the pendulum is operated directly by the magnet, through the impulse spring, that the pendulum only operates the seconds ratchet and closes the circuit at intervals, and that the minutes and hours ratchets are op-

erated by the return movement of the armature lever.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In an electric clock, the pendulum provided with a lateral operating arm, the electro-magnet, the armature-lever, the impulse spring carried by the armature lever and adapted to engage said operating arm, the seconds ratchet engaged by a pawl upon the pendulum, the circuit closer adapted to be engaged by the pendulum and the circuit breaker operated by the armature lever, substantially as described.

2. In an electric clock, the electro-magnet, the contact points, the armature-lever carrying an impulse spring, the pendulum actuated by said impulse spring, and the seconds ratchet engaged by a pawl carried by the pendulum, in combination with a circuit breaker pivotally suspended from said armature-lever and provided with engaging projections adapted to break the circuit when the armature-lever is elevated, substantially as described.

3. In an electric-clock, the electro-magnet, the contact points, the armature-lever carrying an impulse spring, the pendulum actuated by said impulse spring, and the seconds ratchet engaged by a pawl carried by the pendulum, in combination with a circuit closer, pivotally suspended from its upper end and provided with a detent which is adapted to be engaged by a pin on the seconds ratchet, substantially as described.

4. In an electric clock, the combination of the electro-magnet, the contact points, the armature-lever, the impulse spring, the pendulum, the circuit closer engaged by a finger on the pendulum, and the circuit breaker comprising the pivotally suspended arm or latch provided with a lug and a projection adapted to engage the lug and a spring arm of the back plate to break the circuit, the contact pieces and the lateral stud of the pendulum engaging said suspended arm, substantially as described.

5. In an electric clock, in combination, the electro-magnet, the contact points, the armature-lever, the impulse spring, the pendulum, the seconds ratchet operated by the pendulum and the circuit closer comprising a detent P′ which is adapted to be engaged by a pin on said ratchet and a spring arm P, which is adapted to be engaged by a finger on the pendulum to close the circuit, substantially as described.

6. In an electric clock, in combination, the electro magnet, the contact points, the armature-lever, the impulse spring, the pendulum the seconds ratchet operated by the pendulum, the circuit closer the circuit breaker and means substantially as described for automatically setting the clock, comprising the electro-magnet, the armature and the armature-lever, adapted to be engaged by a pin, said pin being secured to the spoke of the seconds wheel, as and for the purpose described.

7. In an electric clock, the combination, with an electro-magnet, the contact points the armature-lever, the impulse spring, the pendulum, the seconds ratchet operated by the pendulum, the circuit closer, the circuit breaker, and mechanism substantially as described for automatically setting the clock, said mechanism adapted to be operated electrically and controlled by a suitable switch as and for the purpose set forth.

8. In an electric clock, in combination, the electro-magnet, the pendulum, the seconds ratchet operated by a pawl on the pendulum, the spring arm and pin carried by the pendulum, the minutes ratchet, the armature-lever carrying an impulse spring to actuate the pendulum and a pawl to operate the minutes ratchet, a circuit closer and a circuit breaker, substantially as described.

9. In an electric clock, the minutes ratchet, the electro-magnet, the armature-lever having one arm extended or weighted and carrying a pawl to engage the minutes ratchet and rotate the same when the armature is released, in combination with the seconds ratchet, the pendulum to operate said ratchet, a circuit closer and a circuit breaker, substantially as described.

10. In combination, the electro-magnet, the pendulum, the circuit-breaker engaged by the pendulum, the armature-lever, the minutes ratchet engaged by a pawl on the armature-lever, the hours ratchet, and the pivoted arm engaging lateral pins on the minutes ratchet and carrying a pawl to operate the hours ratchet, substantially as described.

11. In combination, the electro-magnet, the pendulum, the circuit-closer operated by the pendulum, the armature-lever, the minutes ratchet engaged by a pawl on the armature-lever, the hours ratchet, and the pivoted arm engaging lateral pins on the minutes ratchet, substantially as described.

12. In combination, the electro magnet, the pendulum, the circuit closer operated by the pendulum, the circuit breaker operated by the armature-lever, and engaged by the pendulum to close the circuit, the minutes ratchet engaged by a pawl on the armature lever and provided at its hub with a series of lateral pins, the pivoted arm engaged at its free ends by said lateral pins, and the pawl, carried by the pivoted arm to engage the hours ratchet, substantially as described.

13. In combination, the pendulum provided with an operating arm K, the electro-magnet, the circuit closer, adapted to be operated by the pendulum, the circuit breaker adapted to be operated by the armature-lever (when said magnet is energized) to break the circuit and engaged by the lateral stud of the pendulum simultaneously with the operation of the impelling device, substantially as described.

14. In combination, the pendulum having an operating arm, the electro-magnet, the cir-

cuit closer, the armature-lever, the impulse spring to engage the operating arm and the latch on the armature-lever to hold the impulse spring in contact with the operating arm, substantially as described.

15. In combination, the pendulum, the electro-magnet, the circuit closer operated by the pendulum, the armature-lever, the impulse spring to engage an operating arm on the pendulum and the pivoted latch on the circuit breaker to lock the armature-lever in an elevated position when the circuit is closed, and adapted to be disengaged by a lateral stud on the pendulum, substantially as described.

16. In combination, the electro-magnet, the contact points, the circuit closer adapted to be engaged by the pendulum at one end of its swing, the armature lever carrying an impulse spring to engage the pendulum when the circuit is closed and the engaging latch of the circuit breaker adapted to lock the armature-lever in an elevated position and break the circuit, said latch being engaged by the lateral stud of the pendulum at the opposite end of the swing, substantially as described.

17. In an electric clock, the combination of the hours, minutes and seconds ratchets fixed to concentric spindles, the pendulum to operate the seconds ratchet, the electro-magnet, the armature-lever to operate the hours and minutes ratchets, and having an impulse spring to operate the pendulum, the circuit closer controlled by the pendulum, the circuit breaker actuated by the armature-lever, and devices electrically actuated for automatically setting the clock, substantially as described.

18. In an electric clock, the combination with the electro-magnet, the pendulum, and the armature-lever carrying an impulse spring of a circuit closer controlled by the pendulum, the seconds ratchet to engage the circuit closer at intervals and a gravity pawl mounted on the pendulum to engage the said ratchet and provided with an adjusting screw and a spring arm and pin substantially as specified.

19. In an electric clock, the electro-magnet, the pendulum, the armature lever carrying an impulse spring, the circuit closer controlled by the pendulum, the circuit breaker operated by the armature-lever, the seconds, minutes and hours ratchets mounted on concentric spindles and the pawl of the pendulum engaging said seconds ratchet in combination with an alarm mechanism comprising a continuously ringing bell, the alarm dial, the contact points x, x, the former being suitably insulated and the latter carried by said dial and a suitable switch whereby the alarm may be thrown in or out of circuit, substantially as and for the purpose set forth.

20. In an electric clock, the combination, with the pendulum, the electro-magnet, the armature-lever, the circuit closer controlled by the pendulum, the circuit breaker actuated by the armature-lever, the seconds ratchet, the pawl of the pendulum engaging said seconds ratchet, the pawl of the armature-lever engaging the minutes ratchet, the pawl actuated by said minutes ratchet, engaging the hours ratchets, the electrically operated device as described for setting the clock and the alarm mechanism substantially as and for the purpose set forth.

In testimony whereof I affix my signature in presence of two witnesses.

HERMAN WUBBELER.

Witnesses:

JAMES F. MERRIMAN,

PHILIP DOUGLAS.

(No Model.)

H. S. PAGE.

CIRCUIT CLOSING CLOCK.

No. 494,966. Patented Apr. 4, 1893.

Fig. 1.

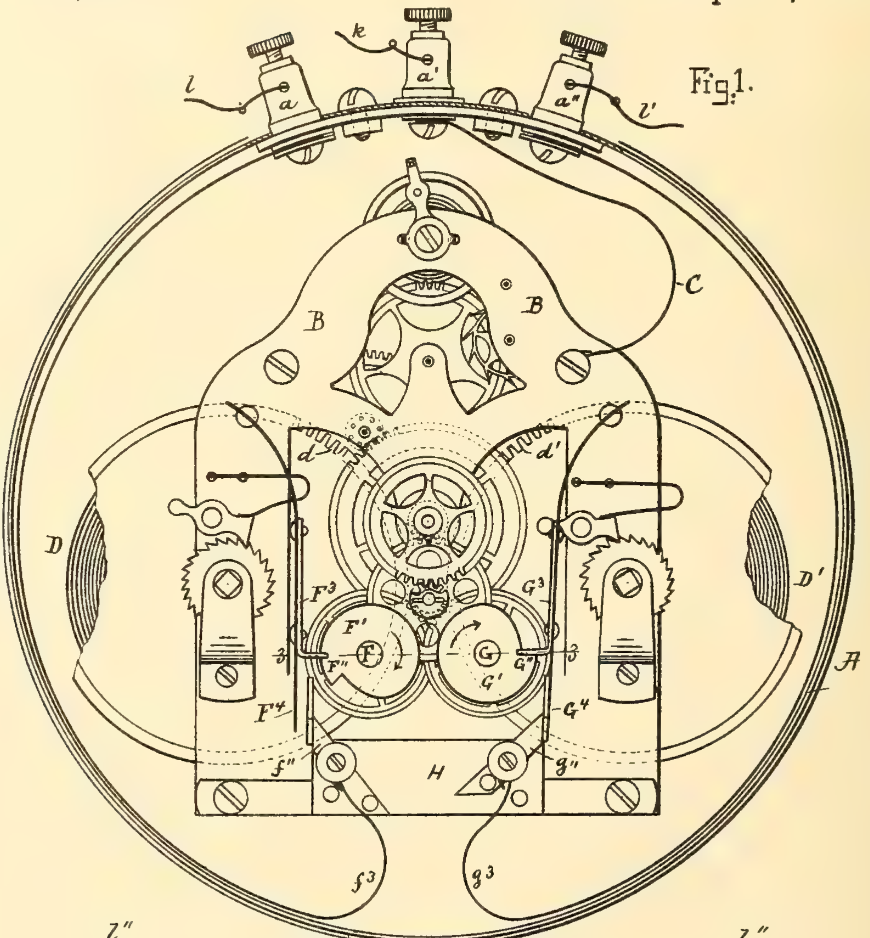


Fig. 2.

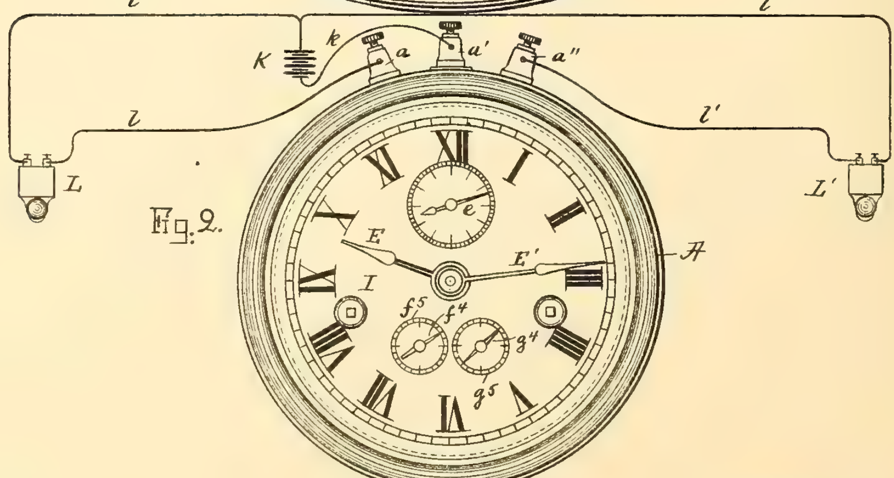
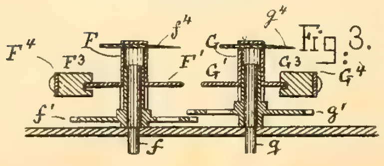


Fig. 3.



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CIRCUIT-CLOSING CLOCK.

SPECIFICATION forming part of Letters Patent No. 494,966, dated April 4, 1893.

Application filed October 3, 1892. Serial No. 447,612. (No model.)

To all whom it may concern:

Be it known that I, HERBERT S. PAGE, a citizen of the United States, and a resident of Medford, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Clocks, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention has for its object to provide a novel, simple, and efficient clock for a closed electric circuit to sound an alarm, or open or close gates of any kind, or otherwise perform any work at predetermined times for which the clock work mechanism may be sent.

To accomplish this object my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which,

Figure 1 represents an interior front view of the improved clock mechanism, the dial of which is shown as removed. Fig. 2 represents a front elevation of the clock and its connection to the battery and alarm or other devices in the circuit; and Fig. 3 represents a cross-section on the line 3—3 shown in Fig. 1.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

A represents the inclosing case of the clock to which are attached in a suitable manner the binder posts a, a' and a''.

B is the frame of the clock mechanism, which frame is preferably made of metal and metallically connected by means of a wire C to the binder posts a' as shown in Fig. 1.

D and D′ are main driver springs as usual by means of which rotary motion is imparted to the main gears d and d' and the respective hour, minute and second hands E, E′, and e as is common in clock mechanisms.

f and g are spindles supported independent of the usual spindles of the hour, minute and second hands, and provided with gears f' and g' which are positively geared in any suitable or well known manner to any of the gears in the clock movement so that said spindles rotate in opposite directions; in practice I prefer to gear each of the spindles f, g, in such a manner as to move one half as fast as the spindle for the hour hand E, but this is not essential as if so desired such spindles f, g, may be geared so as to move equally with the hour hand E. On the spindle f is adjustably secured a sleeve F provided with a cam-disk F′ having a tooth or projection F″ on its circumference as shown in Figs. 1 and 3.

F^3 is a preferably notched metal bar or block which is held in contact with the cam F′ by means of a spring F^4 attached in one end to the frame B as shown in Fig. 1. As the cam projection F″ passes by the lower end of the spring pressed bar F^3, the lower end of the spring F^4 is brought in metallic contact with the insulated electrode f'' which is secured in a suitable manner to a block or sheet H made of hard rubber, fiber, or other suitable insulating material which is secured to the frame B or other stationary part of the clock mechanism.

f^3 is a wire leading from the insulated electrode f'' to the binder post a as shown in Fig. 1; to the sleeve F is attached the hand or pointer f^4 adapted to be adjusted in position relative to the graduated scale f^5 on the clock face I as shown in Fig. 2. Similar and corresponding parts G, G′, G″, G^3, G^4, g'', g^3, g^4, and g^5 are used in connection with the spindle g and the binder post a'' as shown in Fig. 1.

K is the battery, one pole of which is connected to the binder post a', its wire C and frame B by means of the wire k shown in Fig. 2.

L and L′ represent the electrical alarm or other electrically operated devices which are connected to the respective binder posts a and a'' by means of the wires l and l' as shown in Fig. 2. The opposite poles of the alarms, &c., L, L′, are connected together and to the battery K by means of a wire l'' also shown in Fig. 2. It will thus be seen that by adjusting and setting the respective hands f^4, g^4 and their cam disks F′, G′, for the respective times desired, the current through the respective alarms or other electrical devices will be closed as the cam-projections F″, G″ pass by the respective spring pressed blocks F^3, G^3, thus causing said alarms to be actuated at any desired preconceived time or times.

Having thus fully described the nature, con-

struction, and operation of my invention, I wish to secure by Letters Patent and claim—

1. The combination of a clock case A having binding posts a and a', a frame B carrying the clock gearing, an electrical connection C between the frame and one of the binding posts, an insulated electrode f'' carried by the frame and having an electrical connection f^3 with the other binding post, a battery arranged outside the clock case and electrically connected with the binding post a', and an electrical device L, a spring pressed block F^3 carried by the frame in the clock case, a spindle f supported independent of the usual hand spindles of the clock, and a sleeve F mounted on said spindle and provided with a cam disk F' having a cam projection F'', substantially as described.

2. The combination with a clock case A, a frame B arranged therein and supporting time mechanism which comprises main gears d, d' and main drivers D D', the spindles f and g supported independent of the usual hand spindles of the clock, rotated in opposite directions by the time mechanism, and provided respectively with sleeves F and G having cam disks F' and G' provided with cam projections F'' and G'', the insulated electrodes f'' and g'', the spring blocks F^3 and G^3, a battery in a circuit electrically connected to the clock case, and conductors leading from the battery to and through electrical devices L, L' to the insulated electrodes, substantially as described.

3. The combination with a clock mechanism, of spindles f and g supported independent of the usual hand spindles of the clock mechanism and rotated in opposite directions thereby, the sleeves F and G mounted respectively on said oppositely rotating spindles and provided with cam disks F' and G' having cam projections F'' and G'', the spring pressed blocks F^3 and G^3 arranged to be respectively operated by said cam disks, the insulated electrodes f'' and g'' adapted to respectively make contact with the spring-pressed blocks, a battery in the circuit electrically connected to the clock frame, and wires leading from said battery to and through electrical devices and to the insulated electrodes, substantially as described.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 10th day of September, A. D. 1892.

HERBERT S. PAGE.

Witnesses:

ALBAN ANDRÉN,

GEORGE F. PIPER.

(No Model.)

T. P. ADAMS.
ELECTRIC ALARM CLOCK.

No. 495,287. Patented Apr. 11, 1893.

Fig. 1

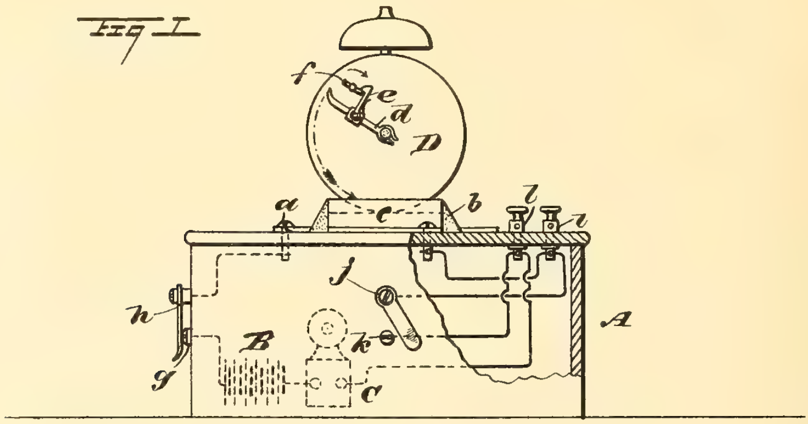


Fig. 2

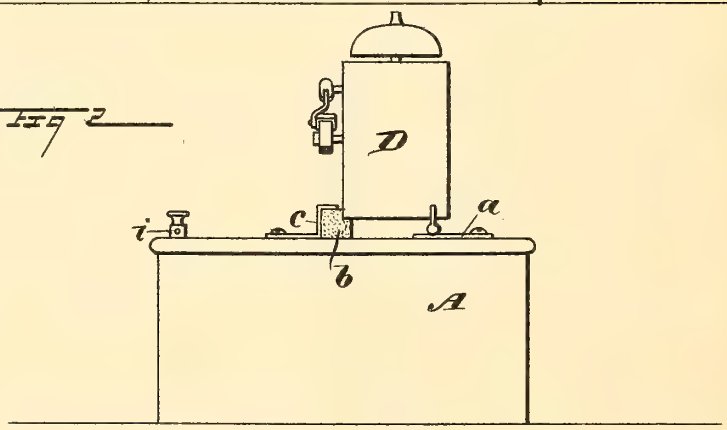
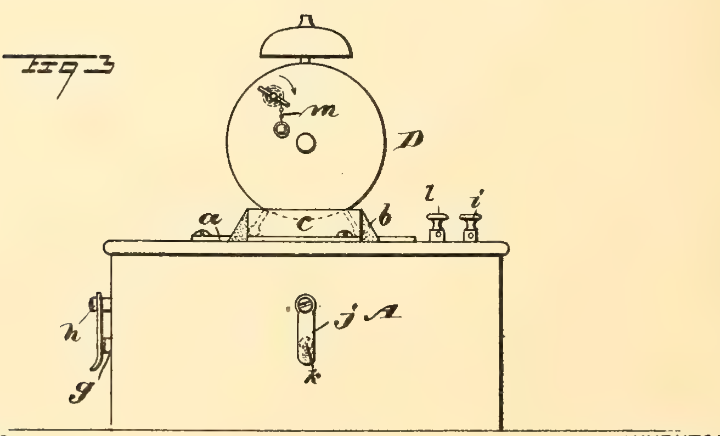


Fig. 3



WITNESSES:

H. Walker

C. Sedgwick

INVENTOR

T. P. Adams

BY Munn & Co

ATTORNEYS.

United States Patent Office.

THOMAS P. ADAMS, OF RICO, COLORADO.

ELECTRIC ALARM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 495,287, dated April 11, 1893.

Application filed May 23, 1892. Serial No. 433,950. (No model.)

To all whom it may concern:

Be it known that I, THOMAS P. ADAMS, of Rico, in the county of Dolores and State of Colorado, have invented a new and Improved Electric Alarm-Clock, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a rear elevation, partly in section, of my improved electric alarm clock. Fig. 2 is a side elevation; and Fig. 3 is a rear elevation of a modified form.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct an attachment to an ordinary alarm clock by means of which an alarm may be given by means of an electric battery and bell, the alarm to continue until the circuit is broken.

My invention consists in the construction and arrangement of parts hereinafter described and claimed.

The case A, which contains the battery B, electric bell C and the electrical connections, is provided at the top thereof with a metal plate *a*, an insulating bar *b*, and an angled plate *c* extending upwardly over a portion of the upper surface of the insulating bar *b*. An ordinary alarm clock D, rests upon the insulating bar *b* and upon the metal plate *a*, and to the rear of the clock case is pivoted a lever *d*, provided with a spring catch *e*, which engages the winding key *f* of the spring alarm of the clock. Although the battery B and bell C are shown diagrammatically in the casing A, they need not necessarily be located within the box. The battery B is connected with the switch point *g*, the switch *h* is connected electrically with the plate *a*, the angled plate *c* is connected with the binding post *i* on the top of the box, and the said binding post is connected with the switch arm *j*. The switch point *k* is connected with the binding post *l*, and the said binding post is connected electrically with one of the binding posts of the electric bell C, the other binding post being connected with the remaining pole of the battery B. When the alarm of the clock is let off, the turning of the lever *d* releases the catch and the lever falls, making an electric contact with the plate *c*. The switch arm *j* being closed on the point *k*, and the switch arm *h* being closed on the point *g*, the current flows from the battery B through the point *g*, arm *h*, plate *a*, clock D, arm *d*, plate *c*, through the switch arm *j*, point *k*, through the bell C, and back to the battery, giving the alarm, which continues until one or the other of the switches is opened. When it is desired to give an alarm at a distant point, wires are run from the binding posts *i*, *l*, to a bell located where the alarm is desired, and the switch arm *j* is removed from the point *k*; then the current flows from the battery B through the point *g*, arm *h*, plate *a*, clock D, arm *d*, plate *c*, binding post *i* to the distant bell, returning to the binding post *l* back to the battery either through the bell C, as shown or directly. When it is desired to prevent the alarm, the switch arm *h* is removed from the point *g*.

In the form shown in Fig. 3, in lieu of the lever *d*, a chain is wound upon the winding arbor of the alarm, and as the alarm runs down, a weight carried by the chain *m*, strikes the plate *c* and completes the electric circuit, when the operation is the same as that already described.

Instead of the extra switch on the side of the box, the binding posts may be connected by switch, and where a distant bell is used, the connections may be varied to have the bells rung in parallel.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a case having on its upper side two contact plates and an intermediate insulating piece upon which and one of said contact plates an ordinary metallic clock is adapted to rest and an electric alarm connected with the said plates, of a circuit maker adapted to be held elevated by the winding arbor of the alarm and when released to descend upon the other contact plate and electrically connect the two plates through the medium of the clock case, substantially as described.

2. The combination with the case A, having contact plates *a* *c*, intermediate insulating piece *b*, binding posts *l* *i*, battery B, alarm C, switch *h* connected with plate *a*, contact, *g*, connected with the battery, contact *k*, connected with post *l*, and with alarm C, and the switch *j* connected with plate *c* and post *i*, of

a circuit maker adapted to be connected with and held elevated by the winding arbor of the alarm and to engage the plate *c*, when released from said arbor, substantially as set forth.

3. The combination with the casing containing an electric alarm, two contact plates on top of the casing in the alarm circuit, and an insulating plate adapted to support an ordinary alarm clock in connection with one of said plates, of a circuit maker comprising a lever *d* having means for pivoting its inner end to the clock and provided with a catch *e* to engage the winding key of the alarm and hold the lever elevated until the alarm goes off and then to release the lever and permit it to drop into engagement with the other contact plate and complete the circuit, substantially as set forth.

THOMAS P. ADAMS.

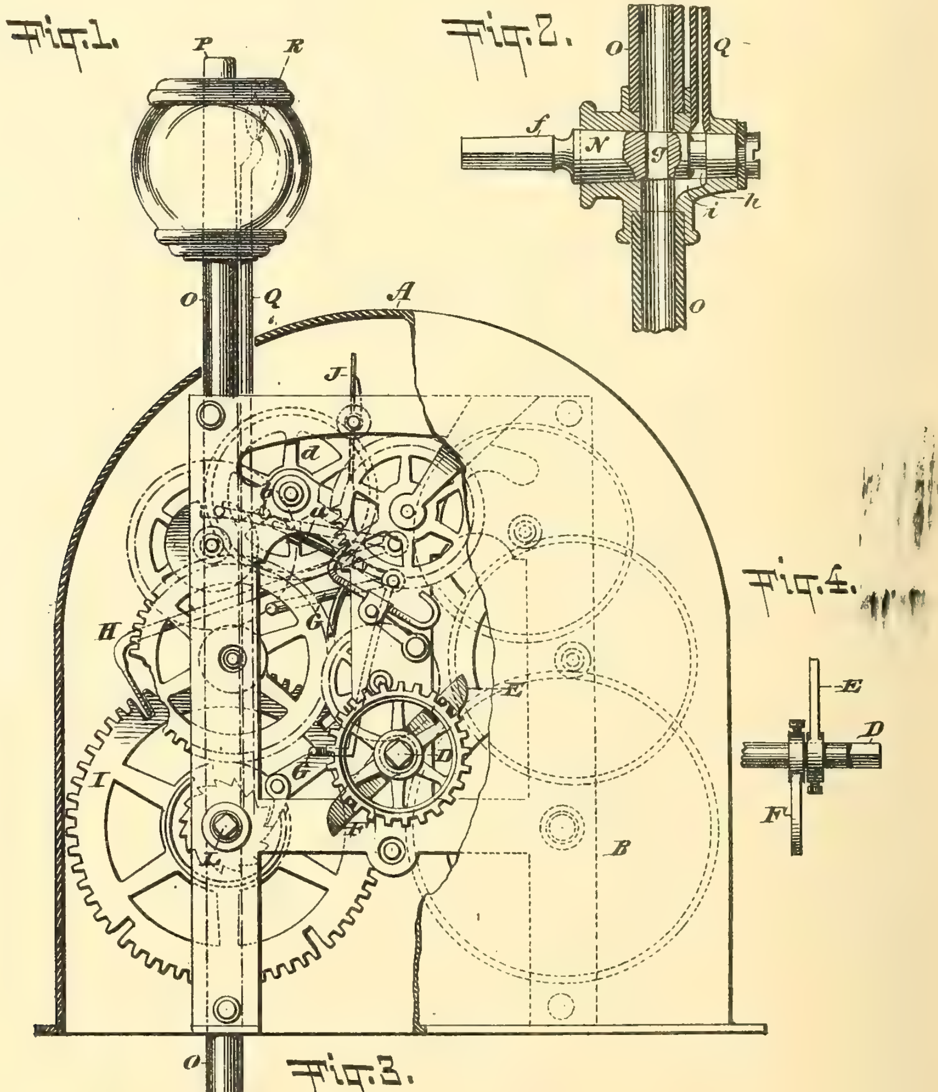
Witnesses:
JOHN VAN DYKE, Jr.,
LOUIS HABERMANN.

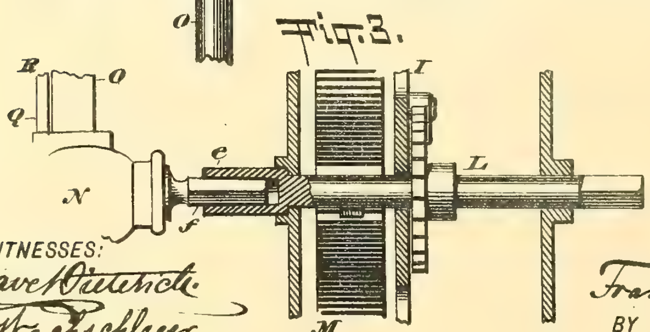
(No Model.)

F. A. LANGWITH.

TIME GAS LIGHTER AND EXTINGUISHER.

No. 495,556. Patented Apr. 18, 1893.





WITNESSES:
Gustave Dieterich.
L. M. Wachschlager.

INVENTOR
Frank A. Langwith,
BY Briesen & Knauth
his ATTORNEYS.

United States Patent Office.

FRANK A. LANGWITH, OF BROOKLYN, ASSIGNOR OF TWO-THIRDS TO JOSEPH J. MYERS AND GEORGE E. McCORMICK, OF NEW YORK, N. Y.

TIME GAS LIGHTER AND EXTINGUISHER.

SPECIFICATION forming part of Letters Patent No. 495,556, dated April 18, 1893.

Application filed December 21, 1892. Serial No. 455,869. (No model.)

To all whom it may concern:

Be it known that I, FRANK A. LANGWITH, a resident of Brooklyn, Kings county, in the State of New York, have invented an Improved Gas Lighter and Extinguisher, of which the following is a specification, reference being had to the accompanying drawings, forming part hereof, in which—

Figure 1 is a front view, partly in section, of my improved gas-lighter and extinguisher. Fig. 2 is a vertical central section of the gas-cock used therein. Fig. 3 is a detail vertical section through the main spring and the parts connected therewith. Fig. 4 is a detail side view of the main clock arbor.

This invention relates to a new arrangement and combination of parts for automatically lighting and extinguishing street lamps and the like, so that the use of a person for doing the individual work every evening and morning may be dispensed with.

The invention mainly consists in supplying what otherwise might be termed the minute arbor of an ordinary clock-work with two adjustable cams or trip-hooks, and also in combining these adjustable cams or trip-hooks with the leverage of the ordinary striking mechanism of clock-work, so that at the proper intervals said leverage will be disengaged to allow a certain main spring to impart the requisite degree of rotation to a shaft which controls the gas-cock.

The invention also consists in the new construction of gas-cock, all as hereinafter more fully described.

In the drawings the letter A represents the frame or casing of a clock-movement, which in all respects, except in the particulars hereinafter specially specified, is like an ordinary clock-movement, and in which a main spring contained in a drum B, which is shown by dotted lines in Fig. 1, is intended to impart rotary motion to an arbor D, which corresponds in position to the minute arbor of a clock, but which in this machine is intended to be geared in such fashion that it shall make one revolution during every twenty-four hours. Upon this minute arbor are hung two projecting arms E and F. These are adjustably secured to the arbor as indicated in Fig. 4, so that they may set, as in Fig. 1, to be diametrically opposite one another, or at any desired other angle to one another. During the rotation of the arbor D, these arms act as trip-hooks against the lever G of the striking attachment, so that when one of the trip-hooks E F moves the lever G, one arm of said lever G lifts the hook H out of the notched wheel I that pertains to what may be termed mechanism analogous to an ordinary striking attachment; while another arm a of the lever G when raised is thereby brought into the path of a pin b on a wheel d which is under the control of the wind-gage J which arrests the parts of the striking attachment until the trip-hook that lifted the lever G shall have cleared said lever, allowing it to drop and allowing the hook H to drop toward the wheel I. All these parts, excepting the two adjustable trip-hooks E F are in every respect analogous to the ordinary clock movement, but the wheel I, instead of having the deep notches to correspond to the hours that are to be struck, has in this instance four deep notches—ninety degrees apart from one another, so that whenever a trip-hook moves the lever G, the wheel I will make a quarter revolution, and will then stop. When after that the next trip-hook moves the lever G, the wheel I makes another quarter revolution, and then stops, &c. The wheel I is connected with a shaft L (see Fig. 3) which in turn connects with a main spring M, so that, the main spring being properly wound, whenever the wheel I makes a quarter revolution, the shaft L makes a quarter revolution. One end of the shaft L forms a key e that engages the angular projection f of the gas-cock N. This gas-cock N is perforated diametrically, as at g Fig. 2, so that in one position (the position shown in Fig. 2) it opens the passage through the main gas-pipe O to the main burner P, while in the position at right angles to that shown in Fig. 2 the gas-cock N intercepts communication from the pipe O to the burner P. The gas-cock N also has a groove h which is constantly in communication with a very small gas-pipe Q that extends from the pipe O to a little pilot-burner R. Below the gas-cock N a branch i from the pipe O communicates with the groove h, all these parts

being so arranged that, no matter how the gas-cock is turned, gas will always be supplied to the pilot-burner R.

Having now described my invention, so far as the construction of parts goes, I will briefly state how it operates: According to the time of year, the arms E and F are set on the arbor D, so that one shall open and the other shall close the gas-cock at the proper time of day. Assuming the arm E to be intended to open the gas-cock and the arm F to be intended to close the gas-cock, the arm E will be set to open the gas-cock at a later hour in summer than in winter, and the arm F will be set to shut the gas-cock at an earlier hour in summer than in winter. This adjustment is easily produced because the arms E and F are adjustable on the arbor D; and I may here state that the adjustment will be sufficiently exact for ordinary purposes if performed, say, once every month. When now, the parts having been properly adjusted, the arm E arrives in contact with the lever G, the wheel I will receive a quarter of a revolution and will thereby turn the gas-cock N into the position shown in Fig. 2, so as to admit gas to the burner P, where it is immediately ignited by the ever-burning pilot-burner R. The gas now continues to burn on P until the arm F moves the lever G, thereby producing another quarter revolution of the wheel I and causing the cock N to be turned so as to shut the gas off from the burner P, &c., it thus appears that the apparatus may be left to itself after proper adjustment at long intervals, and that it will serve automatically to turn the gas on and off at the predetermined time.

The clock mechanism of this invention should be of a kind that will when wound up run a week or a month or any other considerable portion of time.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination of the main gas-pipe O, having cock N, with the arbor L of clock mechanism, notched wheel I, having diametrically opposite deep notches, the lever H, trip-lever G, main clock arbor D, and two adjustable trip-hooks E and F on said arbor D, all arranged so that during each revolution of the arbor D the gas-cock N will be automatically turned twice, once to turn on the gas and once to shut it off, all as specified.

2. In clock mechanism, the arbor D and mechanism substantially as described for turning the same, in combination with the two trip-hooks E and F which are adjustably secured to said arbor, and with the single trip-lever G which is adapted to be affected by both said hooks in succession, as and for the purpose specified.

FRANK A. LANGWITH.

Witnesses:

HARRY M. TURK,

MAURICE BLOCK.

(No Model.)

A. G. GUERIN.

STOP WATCH.

No. 495,583. Patented Apr. 18, 1893.

Fig. 1.

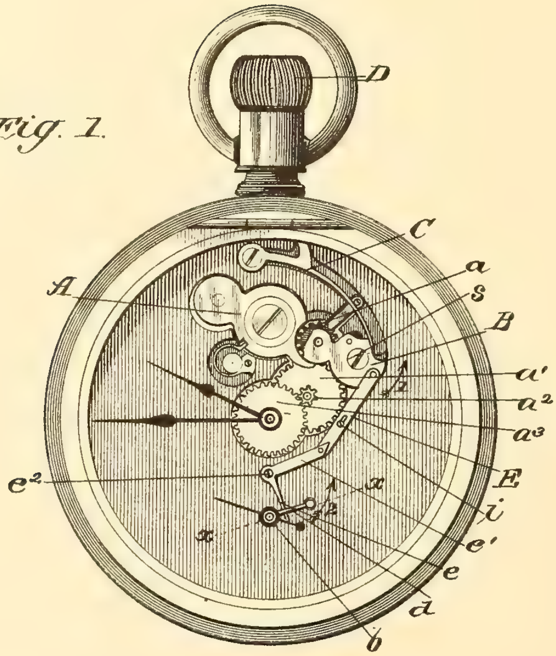
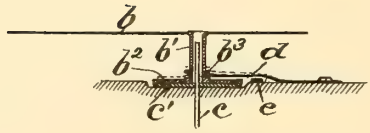


Fig. 2.



WITNESSES:

Fred G. Dieterich

Edw. W. Byrn.

INVENTOR:

A. G. Guerin.

BY Munn & Co

ATTORNEYS

UNITED STATES PATENT OFFICE.

ADOLPHE GEORGE GUERIN, OF SAVANNAH, GEORGIA.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 495,583, dated April 18, 1893.

Application filed June 2, 1890. Serial No. 354,069. (Model.)

To all whom it may concern:

Be it known that I, ADOLPHE GEORGE GUERIN, of Savannah, in the county of Chatham and State of Georgia, have invented a new and useful Improvement in Stop-Watches, of which the following is a specification.

The object of my invention is to provide a stop watch in which the seconds hand is stopped through the stem winding mechanism without stopping the minute and hour hand, or interfering in any wise with the movement of the watch, the purpose being to readjust the seconds hand in relation to the minute and hour hand in setting the watch for correct time, and also to adapt the watch for use for racing purposes.

It consists in the peculiar construction and arrangement of the seconds hand with special mechanism connecting the same to the stem winding and setting devices, whereby the adjustment of the latter to the winding position allows the seconds hand to rotate, while the adjustment for setting the minute and hour hands, serving to stop the seconds hand as will be hereinafter fully described.

Figure 1 is an enlarged face view of the watch with the dial removed showing the position of my improvement beneath the dial and in proper relation to the seconds hand and the stem winding and setting devices. Fig. 2 is an enlarged sectional view taken through the line x—x of Fig. 1.

In the drawings A represents the yoke, B the shifting cam, C the spring, and D the crown of an ordinary and well known form of stem winding and stem setting mechanism. As these devices in themselves form no part of my invention it is not necessary to give any prolix description of their relation and action. It will be sufficient for the purposes of my invention to say that when the crown is pulled out, the small wheel a behind the shifting cam is thrown into gear with the train of wheels a' a^2 a^3 and a rotation of the crown D serves to set or turn the minute and hour hand. When, however, the crown D is forced in, the shifting cam B throws the little wheel a out of gear with the train a' a^2 a^3, and the parts are in position to allow the watch to be wound by a rotation of the crown. I utilize the motion of the shifting cam B to stop the seconds hand by the same adjustment which puts the parts in position for setting *i. e.* by the pulling out of the crown. I will now describe the instrumentalities for carrying out this result.

The seconds hand b is rigidly fixed to a tubular sleeve b' Fig. 2 which has at its lower end a friction disk b^2 and just above it a grooved collar b^3. The axial stem or shaft c of the seconds hand which rotates intermittently with the escapement is provided with upwardly flanged friction disk b^2. Attached to the plate of the watch at one end is a spring arm d which bends upwardly or away from the plate as it approaches the seconds hand, see Fig. 2, and its end next to the seconds hand is forked and lies within the groove of the collar b^3, which latter it embraces. When the spring arm is lifted away from the watch plate, as shown in dotted lines it lifts the seconds hand, its sleeve and friction disk, and brings the latter out of contact with the rotating flanged friction disk below, so that the seconds hand stops, but when the friction disk b^2 lies on the flanged disk with the pressure of the spring arm, the seconds hand rotates with its actuating stem. E is a small slide bar whose upper end is pivoted to the lower end of the shifting cam B, and whose middle part is slotted longitudinally and held to the plate by a guide screw i. The lower end of this slide bar is pivoted to one arm e' of an elbow lever e e'. This elbow lever is fulcrumed at its angle e^2 upon the plate and its arm e projects beneath the spring arm d under which it plays in a nearly right angular position. Now whenever the crown D of the watch is pulled out for setting the watch, the shifting cam B is turned about its center screw s, and the lower end of said shifting cam with slide bar moves upwardly as indicated by arrow 1, and the motion communicated to the elbow lever e e' throws it in the direction of arrow 2, which brings its arm e against the curved under side of spring arm d, raising it, and disconnecting the seconds hand friction disk from its subjacent friction disks, stops the seconds hand. The reverse motion of the shifting cam, caused by the forcing in of the crown, restores the

parts to their former position and the seconds hand moves along again.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a stem winding and stem setting watch, the combination with the shifting cam B; of the slide bar E pivoted thereto and guided about its middle, the elbow lever *e e′* pivoted to the slide bar, the spring arm *d* curved and overlapping the arm *e* of the elbow lever and grasping the sleeve of the seconds hand, and the seconds hand having a separable friction clutch b^2 c' substantially as shown and described.

ADOLPHE GEORGE GUERIN.

Witnesses:

JOSEPH HENRY KOCH,

GUSTAF JOHN SYLVAN.

(No Model.)

A. G. GUERIN.

STOP WATCH.

No. 495,583. Patented Apr. 18, 1893.

Fig. 1.

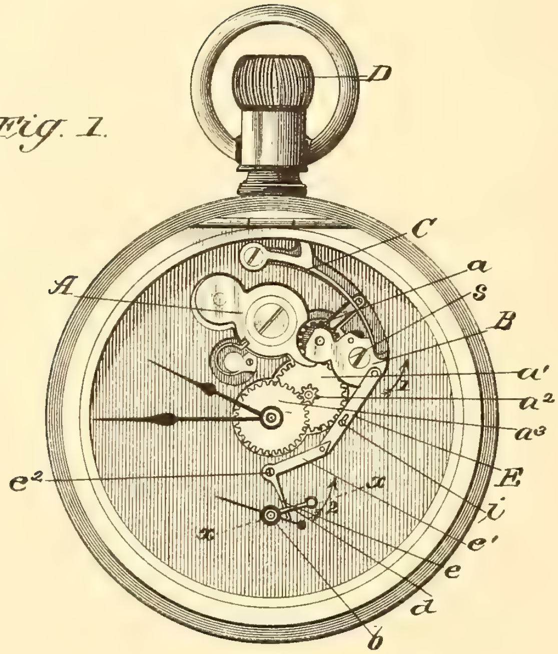
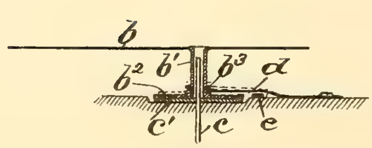


Fig. 2.



WITNESSES:

Fred G. Dieterich

Edw. W. Byrn.

INVENTOR:

A. G. Guerin.

BY Munn & Co

ATTORNEYS

THE NORRIS PETERS CO. PHOTO LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ADOLPHE GEORGE GUERIN, OF SAVANNAH, GEORGIA.

STOP-WATCH.

SPECIFICATION forming part of Letters Patent No. 495,583, dated April 18, 1893.

Application filed June 2, 1890. Serial No. 354,069. (Model.)

To all whom it may concern:

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It consists in the peculiar construction and arrangement of the seconds hand with special mechanism connecting the same to the stem winding and setting devices, whereby the adjustment of the latter to the winding position allows the seconds hand to rotate, while the adjustment for setting the minute and hour hands, serving to stop the seconds hand as will be hereinafter fully described.

Figure 1 is an enlarged face view of the watch with the dial removed showing the position of my improvement beneath the dial and in proper relation to the seconds hand and the stem winding and setting devices. Fig. 2 is an enlarged sectional view taken through the line x—x of Fig. 1.

In the drawings A represents the yoke, B the shifting cam, C the spring, and D the crown of an ordinary and well known form of stem winding and stem setting mechanism. As these devices in themselves form no part of my invention it is not necessary to give any prolix description of their relation and action. It will be sufficient for the purposes of my invention to say that when the crown is pulled out, the small wheel a behind the shifting cam is thrown into gear with the train of wheels a' a^2 a^3 and a rotation of the crown D serves to set or turn the minute and hour hand. When, however, the crown D is forced in, the shifting cam B throws the little wheel a out of gear with the train a' a^2 a^3, and the parts are in position to allow the watch to be wound by a rotation of the crown.

I utilize the motion of the shifting cam B to stop the seconds hand by the same adjustment which puts the parts in position for setting *i. e.* by the pulling out of the crown. I will now describe the instrumentalities for carrying out this result.

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parts to their former position and the seconds hand moves along again.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In a stem winding and stem setting watch, the combination with the shifting cam B; of the slide bar E pivoted thereto and guided about its middle, the elbow lever *e e'* pivoted to the slide bar, the spring arm *d* curved and overlapping the arm *e* of the elbow lever and grasping the sleeve of the seconds hand, and the seconds hand having a separable friction clutch b^2 c' substantially as shown and described.

ADOLPHE GEORGE GUERIN.

Witnesses:
JOSEPH HENRY KOCH,
GUSTAF JOHN SYLVAN.

UNITED STATES PATENT OFFICE.

ALFRED BARTLETT, OF AUCKLAND, NEW ZEALAND.

TIME-INDICATOR AND SIGNAL FOR RACES.

SPECIFICATION forming part of Letters Patent No. 495,770, dated April 18, 1893.

Application filed March 24, 1892. Serial No. 426,314. (No model.) Patented in New Zealand October 27, 1891, No. 5,253; in New South Wales December 1, 1891, No. 3,444; in Victoria December 10, 1891, No. 9,308, and in England January 23, 1892, No. 1,365.

To all whom it may concern:

Be it known that I, ALFRED BARTLETT, a British subject, residing at Auckland, in the Colony of New Zealand, have invented new and useful Improvements in Apparatus for Starting Races and Recording the Results of the Same, (which has been patented in New Zealand, No. 5,253, dated October 27, 1891; in New South Wales, No. 3,444, dated December 1, 1891; in Victoria, No. 9,308, dated December 10, 1891, and in Great Britain, No. 1,365, dated January 23, 1892,) of which the following is a specification.

My invention relates to improvements in apparatus where a bell or other alarm is sounded for starting races; for automatically handicapping the same when time allowances are made; and which apparatus correctly and automatically records the time of the race; and has for its objects performing these operations in a simple and effective manner by suitable mechanism. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1, is a view of the case or stand; the part of which b, shown in elevation contains my clock work mechanism and the part in section contains an electric battery. Fig. 2, is a side view of the same similarly in elevation and section. Fig. 3, is a plan of the same, showing the seconds and minute circles on a larger scale. Fig. 4, is an electrical relay. Fig. 5, shows an electro magnet and armature with clapper and bell or gong attached. Fig. 6, is an auxiliary electric battery. Figs. 1 to 6, inclusive show the arrangement of my apparatus. Fig. 7, is a plan of my clock work mechanism with the clock dial removed. Fig. 8, is a side view of the same and shows the clock dial and hands. Fig. 9, is a plan of my contact making apparatus. Fig. 10, is a sectional elevation of the same on the line 1—2 (Fig. 9). Fig. 11, is a plan of the center part of the contact making apparatus on a larger scale. Fig. 12, is a sectional elevation of the same on the line 3—4 (Fig. 11). Figs. 13, 14, 15, and 16 are views of details.

Similar letters of reference indicate similar and corresponding parts in all the figures.

When my apparatus is used for starting, timing, and handicapping races the case or stand A, shown in Figs. 1, 2 and 3 is placed at the winning post; and the electrical apparatus and bell or gong shown in Figs. 4, 5 and 6 at any desired and convenient starting point. These two parts are connected by the insulated wires a and a', which may be of any suitable length, and are for a purpose to be hereinafter described.

The part of my apparatus situated at the winning post consists, first, of a stop clock inclosed in part b, of the case or stand A, and is shown on an enlarged scale in Figs. 7 and 8. It will be seen that this clock which is constructed to indicate fourth parts of seconds has a train of wheels and pinions in which the great wheel c has eighty teeth, the second wheel d, seventy-two teeth and pinion d', ten leaves; third or center wheel e, sixty-four teeth; and pinion e', eight leaves; minute wheel f, sixty teeth; scape wheel g, fifteen teeth; and pinion g', eight leaves. The escapement is similar in construction to ordinary right angled lever clock escapements. The main spring is inclosed in the barrel c', which forms part of and is in one piece with the great wheel c. h, is the upper clock plate shaped as shown, and h', the lower clock plate which is circular in shape (by preference). These plates are held together by pillars h^2, in any ordinary manner and form the framing in which the clock mechanism works. The center wheel e, is provided with a detent e^2 (shown in detail in Figs. 13 and 14) which once every revolution of the said center wheel engages with the minute wheel f, advancing the same one tooth and the minute hand f^9, one division of the minute circle b^4, (Fig. 3). The depending arm e^3, of the detent e^2, is made of fine spring steel and thus allows the said minute wheel f, to be turned backward and forward while engaged with the said detent. f', shown in detail in Figs. 15 and 16, is a check spring bearing with a light pressure against the teeth of the minute wheel f, and thus preventing the same moving when not engaged with the detent. f^2, is a flat piece of brass or other suitable metal shaped as shown and is provided with a socket f^7, which fits tightly on to the lower end of the

minute wheel arbor f^{10}. f^3, is a spring fixed at f^4, in any suitable manner to the case A. This spring is provided with a point f^5, and a wire f^6, the outer end of which projects beyond the case or stand A as shown in Fig. 3. It will be evident that when the end of the said wire f^6, is pulled the pressure of the point f^5, on the plate f^2, will cause the minute wheel to revolve until the said point arrives at f^8. When the point f^5, is in that position the minute hand f^9, which fits tightly on to the upper end of the said minute wheel arbor f^{10}, always points to 60 on the minute circle. e^4, is the seconds hand fitting tightly on to the center wheel arbor e^5, as shown. c^2, is the winding square fitted with ratchet wheel c^3, click or pawl c^4, and click spring c^5. n, (Figs. 1, 3 and 7) is a lever fixed in any convenient position on the case or stand A, and fulcrumed on a pin n'; this lever n, is provided with a cord n^2, and an arm n^3. It will be seen by reference to the drawings Fig. 7 that when the cord n^2, is pulled in the direction shown by the arrow the said lever n, is advanced to the position shown by the dotted lines, the said arm n^3, pressed against the balance n^4, and the clock instantly stopped. It will also be seen (Figs. 1 and 3) that the free end of this lever projects out from the case or stand A.

It consists secondly, of mechanism shown in Figs. 9, 10, 11 and 12 for making electrical contact and thus in conjunction with the hereinbefore described stop clock, sounding a bell or other alarm at desired times or intervals for starting and handicapping races by time allowances. This mechanism is (for convenience) inclosed in part b, of the case or stand A (see Figs. 1 and 2) and immediately above and around the stop clock (see Fig. 10). In this part of my apparatus, i, i, are springs shaped as shown and of a number to correspond with the sixty seconds on the clock dial b^3, (Fig. 3.) These springs are made of brass (by preference) and are provided with points i', (see Figs. 11 and 12) made preferably of silver or other suitable metal which is a good conductor of electricity and does not easily corrode, and have grooves or notches i^4, and contact points i^5, and are so constructed as to exert their energy in the direction of the arrows (Fig. 9) in an opposite or contrary direction to the revolution of the center wheel arbor e^5, of the clock mechanism. They also press outwardly and radially. i^2, (Fig. 10) is a brass band connecting the said springs together and having a wire i^3, attached, which is connected with the battery j, (Fig. 1.) k, (Figs. 11 and 12) is a brass ring perforated with slots k', for the reception of the points i', two of which are shown in position. This ring k, is fixed by nibs k^3, to a disk of vulcanite k^2, or other suitable non-conductor of electricity thus insulating the same from the clock plate h. The said vulcanite disk is perforated as shown and fixed to the clock plate h, by screws k^4, and separated therefrom by distance pieces k^5. m, (Figs. 9 and 10) are levers provided with knobs or keys m', corresponding in number with the sixty seconds marked on the seconds circle b^5 (Fig. 3.) These levers are bent as shown and fulcrumed on pins m^2. When one of the knobs or keys m', is depressed it will be evident by reference to the drawings that from the position and peculiar shape of these levers m, one of the springs i before described is advanced until its groove or notch i^4, (Fig. 11) engages with the ring k, where it is held by the pressure exerted by the said spring i. e^6, (Figs. 11 and 12) is an arm having a socket e^7, both made preferably of silver, fitting tightly on and traveling with the center wheel arbor e^5. e^8, is a depending spring made preferably of silver, fixed to the arm e^6, and bearing on the disk e^9, made also by preference of silver. This disk e^9, has a wire e^{10}, attached for a purpose to be hereinafter described.

It consists thirdly, of an ordinary three cell Leclanché or other suitable electric battery inclosed (for convenience) in part b', of the case or stand A.

The part of my apparatus situated at the starting point consists of an electric relay E (Fig. 4); a three cell Leclanché or other suitable electric battery F (Fig. 6); and an ordinary electro magnet with gong or bell G, and clapper H, (Fig. 5) inclosed in a suitable case for convenience of handling and transport. By reference to the drawings (Figs. 4, 5 and 6) this arrangement will be readily understood by one skilled in the art to which it appertains; being apparatus similar to that ordinarily used for operating bells by electricity when one blow at a time on the bell by the clapper is desired.

Having now described the several parts of my apparatus, I will proceed to describe the method of operating the same.

The part of my apparatus illustrated in Figs. 1, 2, and 3; and shown in detail in Figs. 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16, being placed at the winning post and the part of my apparatus shown in Figs. 4, 5 and 6, at the starting point and connected together by the insulated wires a and a' as shown, the person in charge of the race pulls the lever n, and thus stops the clock, as before described, at say a second before the seconds hand e^4, reaches the division marked 60 on the seconds circle b^5, (Fig. 3) and then depresses the key or knob m', corresponding to the said division marked 60 on the seconds circle b^5. The object of thus stopping the clock at a second before the hand reaches the division 60 is, that when the competitors are ready, as little time as possible shall be lost in starting the race; for when the said hand reaches division 60 corresponding to the key which has been depressed as stated, the bell G, is sounded at the starting point by electrical contact being made with the same in the following manner:—The arm e^6 is so situated in relation to the seconds hand e^4, that when the latter is over the division corresponding to the key m', which has been de-

pressed, electrical contact is made between the said arm e^6 and the point i^5, of the spring i, which has been previously advanced by the depressed key m', thus connecting the wire e^{10}, through the disk e^9, spring e^8, arm e^6, point i^5, spring i, (Figs. 11 and 12) band i^2 to the wire i^3, (Fig. 10.) The wire e^{10} being connected to the wire a', (Figs. 1 and 4) by means of the contact screw a^3; and the wire i^3, connected to the battery j, electrical energy is exerted along the wire a', to the relay E, (Fig. 4) depressing the armature a^4, and completing the circuit along the wire a, through the contact screw a^5. Electrical energy is now exerted from the battery F, (Fig. 6) along the wire a^7, through the armature a^4, contact screw a^5, pillar a^6, wire a^8, and coil a^9, depressing the armature a^{10}, and clapper H, which strikes the bell or gong G, or other alarm and gives the signal to start the race. The circuit is completed along the wire a^{11}, to the battery F. The arm e^6 (Figs. 11 and 12) continuing to advance carries with it the point i^5, (Fig. 11) until the groove or notch i^4, is disengaged from the slot k', in the ring k, and the said point released by the spring i. The electric circuits are thus broken, when the mechanism is ready to be re-operated.

Having thus described the method of starting a race automatically by my apparatus I will now explain how the same can be automatically and correctly timed.

A cord or tape is stretched across the track at the winning post in the usual manner but fastened at one end to the stop work lever n, (Figs. 1, 3 and 7.) It will be readily understood that immediately the foremost competitor comes into contact with the said tape or cord, the lever n, will be pulled in the direction of the arrow and the clock stopped simultaneously and automatically by the stop work mechanism hereinbefore described (see Fig. 7) and thus a correct record of the time will be indicated. The said cord or tape is preferably made of such a thickness that it will break after operating the stop work lever n.

Having thus described the methods of starting and automatically timing a race by my apparatus I will now explain how the same can be used for automatically handicapping a race by time allowances.

If for instance it is desired to start a race of three competitors in which No. 1 competitor allows No. 2 eight seconds and No. 3 fifteen seconds, the manner of operating my apparatus is as follows:—The person in charge of the race arranges the apparatus, stops the clock at one second before the division marked 60, on the seconds circle b^5, (Fig. 3) as described herein for starting and timing a race where no time allowances are made, and also depresses the keys m', corresponding to the divisions marked 60, 8 and 15. The competitors being ready the clock is started. No. 3 starts when the gong sounds the first time, which will be when the seconds hand of the clock points to 60; No. 2 starts when the gong sounds the second time which will be when the seconds hand points to 8; and No. 1 starts when the gong sounds a third time which will be when the seconds hand points to 15. The race is timed in the manner before described.

The stop clock as described is constructed to beat four times per second, but it is obvious that the train of wheels may be so arranged as to beat any other desired fractions of seconds. For instance if it is desired to arrange the clock to beat five times per second I should make the train as follows:—Center wheel e, sixty teeth, and escape wheel pinion g', six leaves; or any other convenient number of teeth and leaves having the same relative proportion; the remainder of the mechanism being unaltered.

By increasing the number of stops m', and springs i, my apparatus may be arranged to sound the gong at any desired intervals less than a second.

The dial b^3, may be arranged vertically instead of horizontally as shown, or the mechanism constructed to indicate the time on two or more dials in the manner usual in such cases.

Having now fully described my invention and how the same is or may be carried into effect, I wish it to be understood that what I claim, and desire to secure by Letters Patent of the United States, is—

1. In an apparatus for starting races and indicating the results of the same, the detent e^2, depending arm e^3, combined with minute wheel f, and check spring f', as and for the purposes substantially as set forth and described.

2. In an apparatus for starting races and indicating the results of the same, the lever n, having cord n^2, and arm n^3, as and for the purposes substantially as set forth and described.

3. In an apparatus for starting races and indicating the results of the same, the combination of the levers m, having keys m', with the springs i, and insulated ring k, as and for the purposes substantially as set forth and described.

4. In an apparatus for starting races and indicating the results of the same, the combination of the levers m, having keys m', springs i, insulated ring k, and arm e^6, actuated by the stop clock as and for the purposes substantially as set forth and described.

5. In an apparatus for starting races and indicating the results of the same, a stop clock such as described, springs i, with levers m, having keys m', insulated ring k, combined with arm e^6, attached to wheel arbor e^5, disk e^9, wire e^{10}, connecting with electrical apparatus and bell as and for the purposes all substantially as set forth.

ALFRED BARTLETT.

Witnesses:
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W. E. HUGHES.

(No Model.) 3 Sheets—Sheet 1.

C. RUPRECHT.

WORKMAN'S TIME RECORDER.

No. 496,005. Patented Apr. 25, 1893.

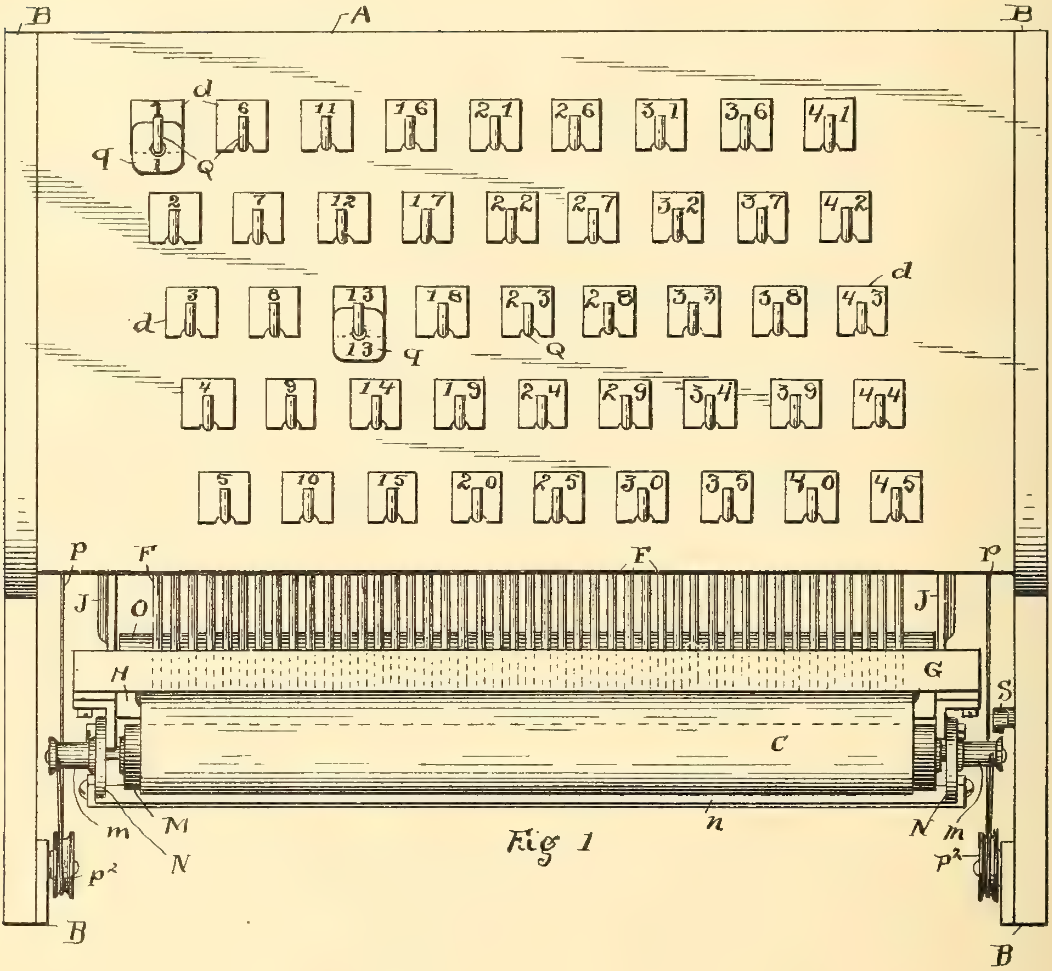

Fig 1

Fig 9

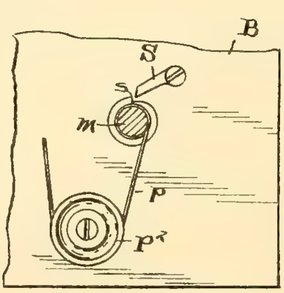

Fig 8

ATTEST.
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(No Model.) 3 Sheets—Sheet 2.

C. RUPRECHT.

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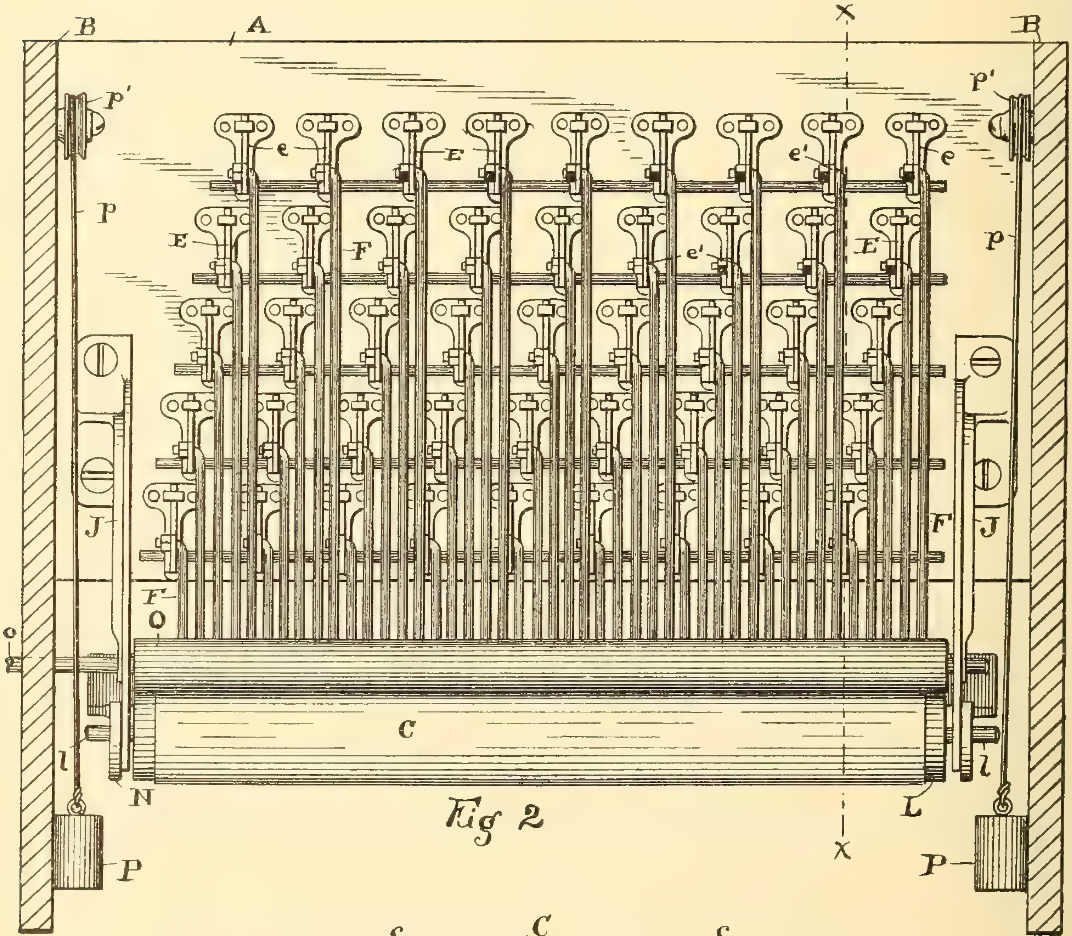

Fig 2

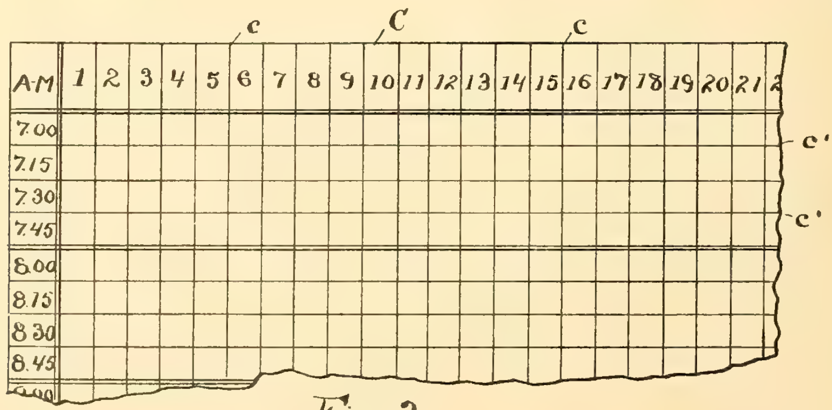

Fig 3

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WORKMAN'S TIME RECORDER.

No. 496,005. Patented Apr. 25, 1893.

Fig 4

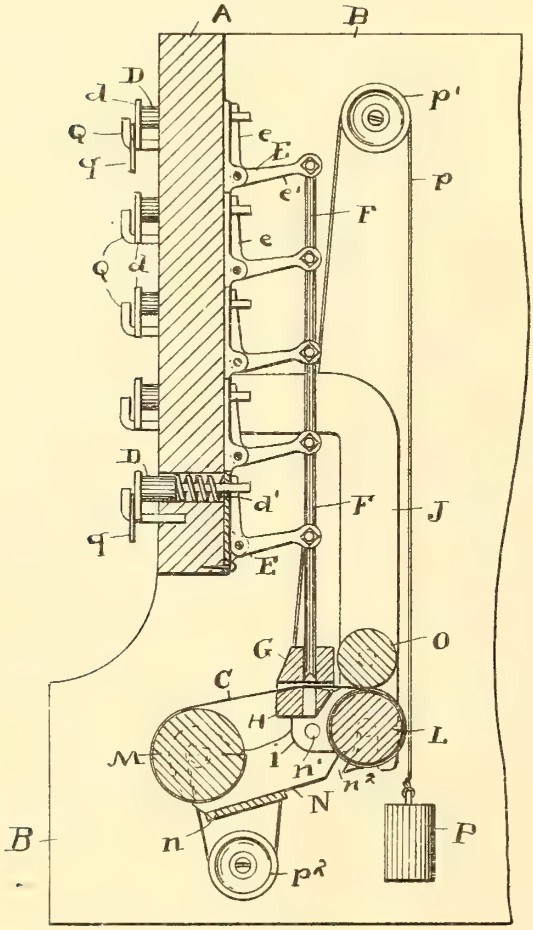


Fig 5

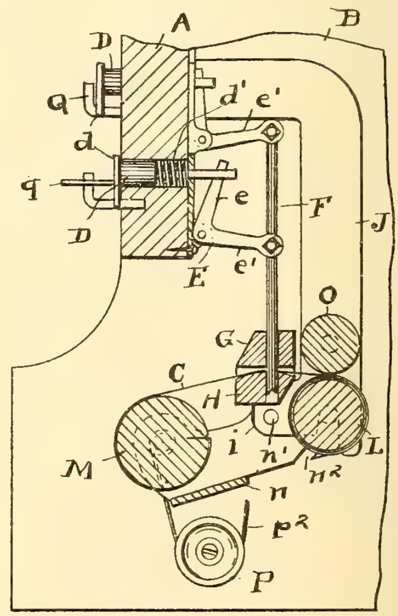


Fig 6

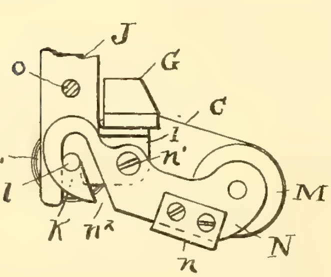
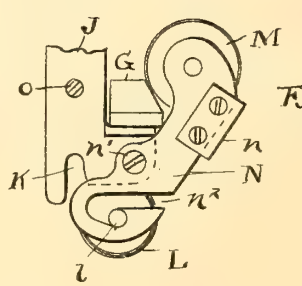


Fig 7



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UNITED STATES PATENT OFFICE.

CHARLES RUPRECHT, OF CLEVELAND, OHIO.

WORKMAN'S TIME-RECORDER.

SPECIFICATION forming part of Letters Patent No. 496,005, dated April 25, 1893.

Application filed June 6, 1892. Serial No. 435,593. (No model.)

To all whom it may concern:

Be it known that I, CHARLES RUPRECHT, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Workmen's Time-Recording Machines; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in workmen's time recording machines, and the object of the invention is to provide a simple, cheap, and reliable medium for noting the exact time when a workman enters upon his work and when he leaves it, and for keeping a record of such arrivals and departures so that at the end of a week, or at a longer or shorter time, the record thus made and kept can be reviewed and the number of hours of work of any given employé accurately ascertained.

To this end the invention consists in the construction of a device or machine substantially as shown and described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a front elevation of my improved machine, and Fig. 2 is a rear elevation thereof. Fig. 3 is an end section of the sheet or roll of paper used to receive and keep the record. Fig. 4 is a vertical section on line x, x, Fig. 2, showing the parts in their normal position. Fig. 5 is a similar cross section showing one of the punchers down in the act of puncturing the paper. Fig. 6 is a side elevation of the mechanism at one end of the paper feeding rolls showing the normal position of said parts; and Fig. 7 is a side elevation of same parts but reversed to remove the inner roll. Fig. 8, Sheet 1, shows side and end views, respectively, of one of my punches. Fig. 9 is a section of the drum and side view of dog that engages said drum.

A represents the upright or supporting board or frame of my recording mechanism, and this part may be composed of a single board of suitable size, or a number of boards joined together, or, it may be composed of metal or other material, if such other materials be found desirable, but preferably it is made of wood and is adapted to be supported either on a base and side supporting frame B, as here shown, or it may be supported on the wall or in some other convenient position or way. This board or frame A is made in a number of different sizes, according to the demands of the shop, or place where it is used, and is adapted to be used to make a record for one or more persons, running up into the hundreds. Each person whose record is kept has an allotted number, and finds his own number at the front of the said board. Thus we have, in Fig. 1, several series of numbers running diagonally across the board from top to bottom in zigzag lines so as to make each number record in its own line upon the recording surface or paper C, as hereinafter described. The distance apart of the indentations or holes which are cut to make the respective records will depend on the arrangement of the mechanism on the board A, and if said board is to be made available for the greatest amount possible of recording capacity, this mechanism should be placed as close together as possible, having in view distinct lines of record for each man on the paper C. The numbers 1, 2, 3, &c., seen in front elevation in Fig. 1, are, in fact, placed upon the heads d of what may be called the push buttons or keys, D, which are set into the face of the board A, and adapted to slide back and forth therein within fixed or given limits. When these keys or push buttons are in their normal position they are out as shown in Fig. 4, and at the top in Fig. 5, but when they are pushed in, as they are in the act of puncturing the paper to make a record, they occupy the position shown also in Fig. 5, with the flange d resting against the board A. A spring d' serves to press these buttons or keys out after they have been used. Each button has a spindle D which projects through the rear of the board A, and is connected at that point with the upper arm e of the bell crank lever E, pivoted in its angle on the rear of the board A. The other arm, e', of the said lever E has pivoted to it the puncturing wire or rod F. These puncturing wires or rods are of varying length, according to the elevation of the particular bell-crank lever with which they are connected, and ordinarily are made of wire of a suitable size to do the work. At their lower portion these wires or rods F

pass through the cross bar G, which serves as a guide for said rods or wires, and which said bar is fixed at its end by suitable means to a lower cross bar H, which latter is fixed at its ends to the lower extremities of the hangers J. These hangers are secured at their upper ends to the rear of the board A, as seen plainly in Fig. 5, and have forwardly projecting portions i at their lower extremities suitable for fastening thereto the lower cross piece H, and this cross piece H is separated from the cross piece G above a sufficient distance to permit the sheet of paper on which the record is made to pass freely through between said piece, and is perforated also for the passage of the puncturing rods or wires F, so that when said wires are depressed by the mechanism herein shown and described, they will cut a hole through the paper and immediately resume their normal position. The lower extremity of these rods or wires F have a V shaped notch formed therein, as clearly seen in Fig. 8, so as to make a clean, round perforation in the paper. The paper roll or sheet C is first placed upon the roller L, and is unwound from there, as the herein described mechanism permits, and onto the roller M. These two rollers are supported in a frame consisting of end piece, N, and a cross piece n rigidly connecting said end pieces, and are each pivoted at n' in the forward projecting portion of the hanger J and off the center or middle of the said side pieces N, so that normally the parts shall occupy the position shown in Figs. 4 and 5, without other means to hold them in said position than the greater weight of the parts outside of the pivot n as compared with what is on the short side of said pivot. It is desirable to remove the roller L when a supply of paper is to be placed thereon, and hence this pivot mechanism which enables the said roller to be lowered as seen in Fig. 7, for removal from the parts N. The said roller has bearings in the said parts N and an open slotted passage n^2 through which its spindles l are removed and inserted. These spindles project far enough through the said parts N to engage in the open slot k in the bottom of the hanger J. Hence, when the parts are in working position the spindles l of the roller L will rest both in the bearings in the parts N and in the open notch or slot k and when in this position the said roller L cannot escape from its bearings and is held securely in working position. Now, in order that the said roller L which carries the paper shall travel only at a given and uniform rate of speed, and at the speed to which all the parts herein described are timed, I employ another roller O, which is fixed in suitable bearings in the hangers J and bears upon the said roller L through the paper C wrapped about the same. The slots k are made of such depth that the spindles l will not ordinarily be limited in their vertical movement by said slot, so that the counter pressure upon the roll L will be upon the paper against the roll O above. This enables the wrapping of paper about the said roll to be more or less heavy and yet have a uniform bearing against the roller O, and it also enables the roller O to serve as a feed roll for the paper. Clock mechanism is designed to be connected with the shaft o of the roller O, and this mechanism will be timed so that the said roller O shall have a given and uniform rate of movement. The paper passes from the roller L upon the roller M, and in going from one to the other is punctured to make the record as the coming and going of the employés may determine. In order that there may be some certain tension upon this roller M so as to stretch the paper and roll it tightly upon the roller M, but yet not interfere with its feeding over the roller L, I use a counter-weight P, which is connected by a cord p, over sheaves p', p^2, onto a sheave or pulley m fixed to the spindle of the roller M outside of the hanger J in which said roller M is supported.

In order that sheet of paper C may be utilized as herein described to keep the record for each employé separate from the others, the puncturing wires or rods are all arranged to strike the said sheet in different lines, and these lines are numbered 1, 2, 3, 4, &c., to correspond with the keys bearing like numbers. These lines c run longitudinally of the paper, while transversely of the paper are the time lines c'. These time lines are subdivided on the hours and fractions thereof, as 7 o'clock, 7.15, 7.30, 7.45, and so on, and the subdivisions may be on shorter or longer time. If, therefore, an employé comes at exactly seven o'clock, the paper is supposed to be at that point in its movement where a puncturing rod will strike exactly on the line corresponding to that hour. If the employé be fifteen minutes late, it will strike on the 7.15 line; if he be five or ten minutes late, the puncture will come between the two lines and indicate by its position in respect thereto about what time the employé arrived. In like manner he will record his leaving, and all will make their records as they come and go in like manner.

Now, in order that each employé may register his time aright, he is furnished with a pocket plate q which is of a size small enough not to be inconvenient in the pocket, and which bears his number corresponding to the number upon the head of the buttons or keys D. For example, two such plates are here shown, numbered 1 and 13 respectively, and are shown as hanging on the hooks or pins Q, one of which is provided for each key. These pins, as seen in Fig. 4, are bent at right angles so that they have a vertical portion which extends up about half way across the face of the flange d, of the button, and against which said flange may bear. At any rate, these parts are brought close together. The plates q have a central hole adapted to slide somewhat freely over the pin q, but owing to the right angled extremity of the said pins bearing against the flanges d, the said plates q can

neither be inserted nor removed without so pressing the buttons inward that they will puncture the paper C and make a record.

When the employé comes to his work in the morning he places the plate *q* in position on its pin, and to do so brings it to a horizontal position, substantially as seen in Fig. 5. This is also the position to which the said plate is brought to remove it from the said hook, so that in either case a puncture of the paper will be made. In going to work, the plate is placed in position, as shown in Fig. 1, and allowed to remain there until the employé wishes to quit work temporarily, or for the day. It is then removed and the puncture tells the exact time when the removal occurs, and thus the record of the day is made complete and the time of each employé is accurately recorded and can be afterward summarized or aggregated from the roll of paper wound upon the roller M, either at the end of the day or at the end of the week, or at any other convenient time.

The clock mechanism by which the instrument is actuated is not shown, and any suitable actuating mechanism or power may be employed for this purpose.

The recording mechanism being geared with the clock through shaft *o*, and the paper being placed to register exactly with the hour at which the clock is started, the two will move together, and the time on the paper and on the clock will always agree. As here shown, the paper is divided transversely on fifteen minute or quarter hour subdivisions, and the gearing through which the rolls are timed should be such as to move the paper just fifteen minutes ahead with each fifteen minute movement of the hands of the clock. If this movement of paper and clock be kept together there can be no mistake in the record, and the said record can be made for any fraction of an hour desired.

By the construction of roller frame shown, the paper receiving roller can be filled down, as seen in Fig. 7, so that the roller L can easily be taken out and replaced from the front of the machine. This is a great convenience in the practical operation of the machine.

The counter weight P serves to give a steady pull on the roller M through the drum *m* on the spindle of said roller and the cord *p*. This weight insures a tight wrapping of the paper on the roll and may be so considerable as to facilitate the feed of the paper through the rollers L and O, and thus help the clock, but in no case shall the paper travel faster than the clock allows. When the roll M is filled with paper, the paper is drawn off with the roll in position as shown, and in drawing the paper off, the cord *p* is wound upon the drum *m*, and the counter weight P is raised to its higher position. When the roll M is stopped, a dog, S, shown in Fig. 9, Sheet 1, is dropped into the notch *s* at the end of the said drum, and the said roll is thus held against its counter-weight. Then when the new sheet of paper is fixed to the roll M everything is in readiness for operation, the dog S is thrown out, and the counter-weight immediately comes into action.

It will be noticed that the heads *d* of the push buttons D have notches overlapping partly the pins Q, so that the plates *q* cannot get beneath the said push buttons when they are being put on or taken off, and so that they cannot be put on or taken off without depressing the push button about as shown in Fig. 5.

I have described this invention as a workman's time recorder, and it is designed to be used as such, and is built for this purpose, but, obviously, it is not necessarily limited to the use of workmen or employés in shops and factories and other places where men are paid according to the time they engage in work, but it may be used for all purposes for which it may be found useful. It would serve as well as a watchman's time detector. I do not therefore consider the invention limited in its use to any particular class or classes, or for any special purpose or purposes.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The machine provided with push buttons and punches operated by said buttons, in combination with a hook for each of said buttons, having its free end opposite the outer extremity or head of the button and immediately in front thereof and arranged to hang a plate upon, substantially as described.

2. The series of push buttons and the punches operated thereby, in combination with substantially right-angled hooks having their free ends extending upward in front of the extreme outer portion of said buttons, and plates on said hooks in front of the said buttons and bearing against the outer extremity or head thereof, substantially as described.

3. The combination of the push buttons, D, having springs to press them forward, the bell crank levers, E, and the punches, F, in combination with right-angled hooks, Q, having a vertically arranged free end extending up part way across the face of the push button, and a separate plate having an orifice to engage upon said hook and to hang between the head of the push button and said hook and to bear against the push-button and press it in when the record is made, substantially as described.

4. The punches and the keys and connections to operate the same, in combination with the transverse guide piece provided with perforations for the passage of said punches, and a cross piece having holes registering with the perforations in said guide piece, in combination with the rolls and the sheet of paper on said rolls extending between said perforated cross pieces, substantially as described.

5. The main frame, the roll frame pivoted therein on its center, and having an open slot through which the paper supply roll is intro-

duced and removed to its bearings, and an open slot in the main frame into which the spindles of the said paper supply roll extend, substantially as described.

6. The main frame and the pivoted roller frame supported thereon on its center, the paper supply roll and the friction roller in engagement therewith to turn the same, the paper receiving roll and paper connecting said rolls, in combination with transverse perforated bars through which the paper is fed, and puncturing wires or rods operating through said perforated bars, substantially as described.

Witness my hand to the foregoing specification this 31st day of May, 1892.

CHARLES RUPRECHT.

Witnesses:

H. F. FISHER,

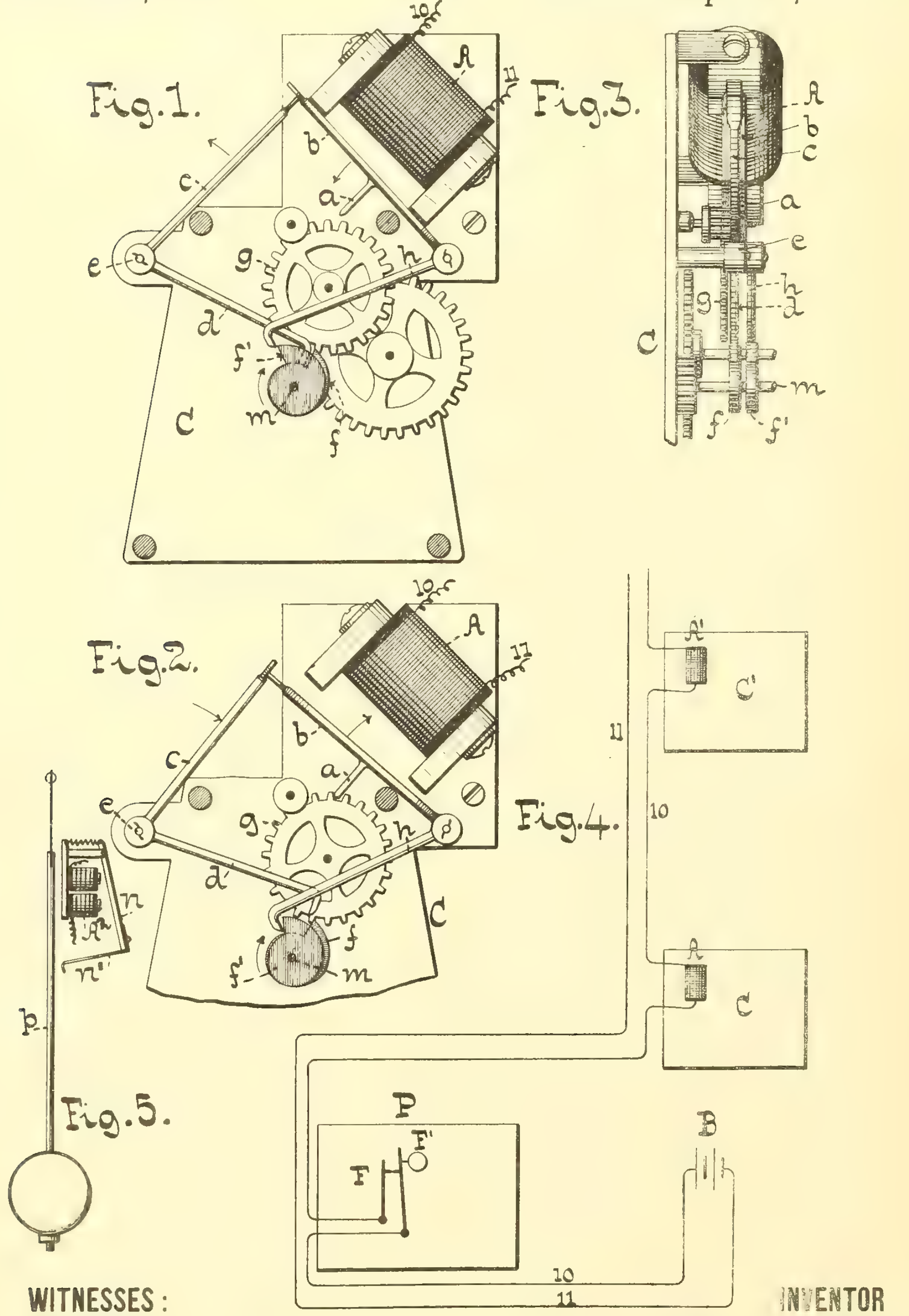
NELLIE L. MCLANE.

(No Model.)

H. S. PRENTISS.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

No. 496,134. Patented Apr. 25, 1893.



WITNESSES:

Klas H. Terustedt

J J Malle.

INVENTOR

BY Henry S. Prentiss

A Faber du Faur Jr.

ATTORNEY

UNITED STATES PATENT OFFICE.

HENRY J. PRENTISS, OF ELIZABETH, NEW JERSEY.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 496,134, dated April 25, 1893.

Application filed May 21, 1892. Serial No. 433,883. (No model.)

To all whom it may concern:

Be it known that I, HENRY S. PRENTISS, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Synchronizers for Clocks, of which the following is a specification.

My invention has reference to improvements in apparatus for synchronizing time pieces and it consists essentially in regulating the several secondary clocks of a system to run slightly fast, and providing each of the same with a mechanical detent thrown into action at the hour as indicated by the respective clock to arrest the motion of the train, combined with means operated from the primary clock to release the train at the exact hour;—all of which is more fully pointed out in the following specification and claims and illustrated in the accompanying drawings, in which:

Figure 1 represents a sectional elevation of a clock constructed according to my invention. Fig. 2 is a similar view with part broken away, showing the motion of the train arrested. Fig. 3 is a side elevation of Fig. 1. Fig. 4 is a diagram illustrating the clocks arranged in a system. Fig. 5 is a detail view showing means for starting the pendulum.

Similar letters and figures indicate corresponding parts throughout the several views.

In the drawings, referring at present to Figs. 1 and 2, the letter C designates one of the secondary clocks, which may embody any suitable well known movement, such for instance as a pendulum or lever movement, or an electric or electro-mechanical movement.

In the drawings I have shown a pendulum movement in which m is the arbor of the minute hand and g one of the gears constituting the train.

a is a detent adapted to engage with the gear g the same being carried by the pivoted armature b of an electro-magnet A. Normally the detent a is held out of engagement with the gear g, by the arm c of a locking lever $c\ d$ pivoted at e to the frame, the other arm d deing in engagement with a cam f mounted to turn with the minute arbor. The armature b carries a finger h, arranged to ride on a cam f' also secured to the arbor of the minute hand and designed similar to the cam f. During the greater part of the hour the arm d of the locking lever $c\ d$ rides on the depressed portion of the cam f (Fig. 1) but toward the end of the hour it is gradually turned until just before the hour it is caused to release the armature b. The latter however is prevented from falling by the finger h which is now on the raised portion of cam f'. Exactly at the hour as indicated by the clock, the finger h drops over the nose of the cam f' and the motion of the train is arrested by the detent a. The lever $c\ d$ now rests against the end of the armature b (Fig. 2). At the hour as indicated by the master clock (the secondary clock being fast), the circuit is closed through the electro-magnet by the circuit closer at the master clock, and the detent a is withdrawn from the gear g and the train is free to operate. The lever $c\ d$ now being released falls into the position shown in Fig. 1, and holds the detent clear of the gear when the circuit through the electro-magnet is broken.

In Fig. 4, I have shown the clocks arranged in a system (series). P is the master clock, F F′ the circuit closing device, B the battery, and 10 and 11 the wires including the electro-magnets A A′, &c., of the secondary clocks C C′, &c.

In the operation of the system, all the secondary clocks are regulated to run a trifle fast, say from one tenth to five seconds per hour, or for the synchronizing period. In an extensive system of clocks where it may be difficult to keep all the clocks constantly running fast, the clocks may be regulated as usual and devices in addition to those described embodied to synchronize slow running clocks. Therefore I do not wish to restrict myself to running the clocks fast.

In general each clock is so regulated that it shall not remain idle a sufficient time to permit the governing member, for instance the pendulum p, to come to rest; however to provide for such an event a suitable starting device for the pendulum may be employed. As shown in Fig. 5 this may consist of an electro-magnet A^2 included in the circuit with the electro-magnet A, the pivoted armature n

of which is provided with a spring arm or extension n' normally out of the path of the pendulum. When the armature n is attracted at the hour the arm n' impinges upon the pendulum rod and causes the same to vibrate, should it have been in a state of rest. In case of a lever movement a similar device may be used to start the balance wheel.

I do not wish to restrict myself to the specific arrangement and construction of the several devices, since it is evident that changes could be made in these respects without departing from the spirit of my invention.

What I claim as new, and desire to secure by Letters Patent, is—

1. A time piece provided with a self-contained detent actuated from the train of said time piece to engage with the train and arrest the motion thereof at the hour as indicated by said time piece, and an electro-magnet arranged to act on said detent for effecting the release of the train at the exact hour, substantially as described.

2. A master clock provided with a circuit closer thrown into action at the hour to make and break the circuit, combined with a secondary clock having a mechanical detent actuated from the train of the time piece to engage with and arrest the motion of the train at the hour as indicated by said time piece, and an electro-magnet vitalized by the closing of the circuit at the master clock to withdraw the detent from the train, substantially as described.

3. A secondary clock provided with cams f f' on the arbor of the minute hand, a locking lever actuated from one of said cams, a detent engaging the other cam and an electromagnet for withdrawing the detent, substantially as and for the purpose set forth.

4. The combination of a master clock provided with a circuit closer, a secondary clock provided with a detent adapted to arrest the motion of the train at the hour as indicated by the said clock, and a starting device arranged to engage with the governing member to impart an impulse to the same on the closing of the circuit by the master clock, substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 20th day of May, 1892.

HENRY S. PRENTISS.

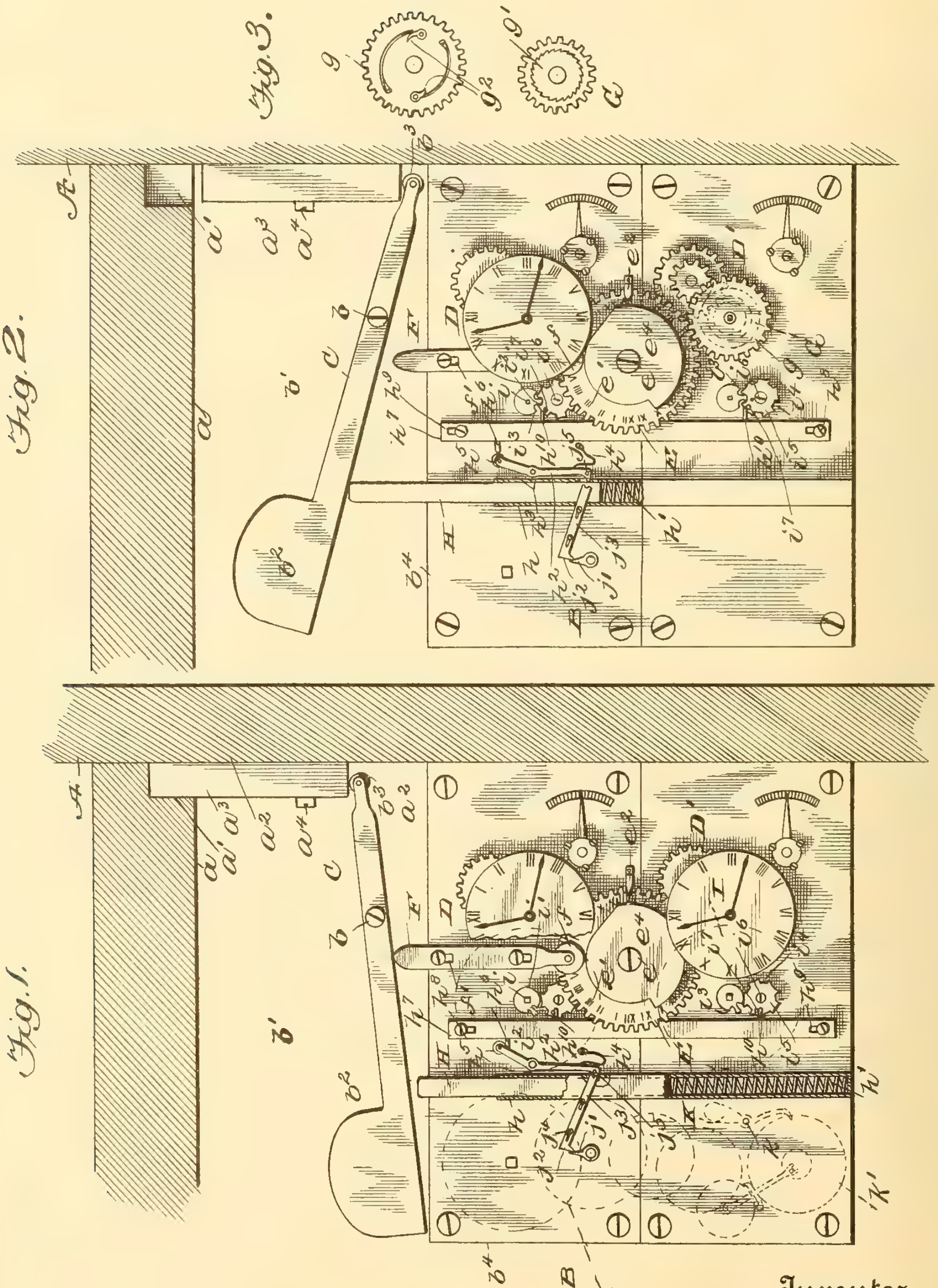
Witnesses:
KLAS H. TERUSTEDT,
J. J. MALLE.

(No Model.)

E. B. WOODWARD.

TIME LOCK.

No. 496,241. Patented Apr. 25, 1893.



Witnesses

J. R. Emirie

Wm. S. Hodges

Inventor

Earl B. Woodward

By John Wedderburn,

Attorney

UNITED STATES PATENT OFFICE.

EARL B. WOODWARD, OF MORRIS, MINNESOTA.

TIME-LOCK.

SPECIFICATION forming part of Letters Patent No. 496,241, dated April 25, 1893.

Application filed July 7, 1892. Serial No. 439,215. (No model.)

To all whom it may concern:

Be it known that I, EARL B. WOODWARD, of Morris, in the county of Stevens and State of Minnesota, have invented certain new and useful Improvements in Time-Locks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in time-locks for safes and it has for its object, primarily, the production of cheap, simple and highly efficient mechanism for locking a safe and preventing the opening thereof save at a stated time.

A further object is to provide a safe having double time-clock mechanism with an additional or auxiliary reserve clock which is used to effect the opening or releasing of the holding mechanism only in the event that the double clocks fail in their operation.

A further object is to provide a time-lock for use with jeweler's and other steel-lined fire-proof safes and capable of being readily and easily applied to safes now in use by any watch-maker, no special fitting of the safe being required.

The invention comprises a time-lock having two trains of clock-gearing, a lever operating a locking plate, which engages the locking bolt, a main gear-wheel moved by both of said clock gearings, and a movable bar operated by said wheel and designed to raise said lever for releasing the locking plate.

The invention further comprises a time lock having two trains of clock-gearing, a weighted lever operating a plate which engages the locking bolt, a spring pressed rod and mechanism for holding and releasing said rod in the event that either of said clock gearings should run down, thereby causing said rod to operate said weighted lever and release the slide.

The invention further comprises a time-lock having two trains of clock-gearing for operating the locking plate, an auxiliary rod, and an auxiliary clock-gearing for operating said rod in the event that both of said trains of clock-gearing fail in their operation.

The invention also comprises the detail, construction, combination and arrangement of parts, substantially as hereinafter fully set forth and particularly pointed out in the claims.

In the accompanying drawings:—Figure 1 is a front elevation of my improved time-lock shown applied to a safe door, a portion of which is broken away. Fig. 2 is a similar view with one of the clock-dials and hands removed, and showing the position occupied by the parts when one of the clock-gearings has run down. Fig. 3 shows in detail one of the wheels that permits the clock-gearing to continue independently of the other.

Referring to the drawings, A designates a safe-door, and a a sliding bolt thereof having a groove or recess a' cut in its underside and extending inwardly a short distance.

To the adjacent side-wall a^2 of door A is a movable locking plate a^3 held by a screw a^4 extended through a slot therein. This plate corresponds in thickness with the groove or recess in the bolt and when inserted therein holds the latter firm in place.

B designates a box or casing in which I preferably locate the clock-gearing and adjuncts, said box or casing being held by screws projecting through the side wall a^2 of door A.

Upon a stud b projecting from the upper end of the rear-wall b' of box B is fulcrumed a lever C, which at its outer end has a weight b^2 and at its other end a roller b^3 which is continuously in engagement with the lower end of the locking plate a^3. When in its normal position said lever holds the locking plate elevated into the groove or recess of the locking bolt.

Within box or case B between the rear wall b' thereof and an inner wall b^4 are located the series of wheels composing the upper and lower clock-gearings D, D', each having its own dial and hands, the latter of both gearings moving in the same direction.

About midway between the dials of the two trains of gearing is a gear-wheel E, mounted on an arbor e supported by walls b', b^4. This wheel revolves once every twenty-four hours, and has on its periphery a double set of dial

indices e'. A pointer e^2 attached to wall b^1 projects over the rim of this wheel and enables the latter to be set at the proper hour to correspond with the exact time of day. Upon the same arbor e is a cam e^4 against the periphery of which bears a roller f of a bar F held to wall b^4 by screws inserted through slots f'. This bar when raised by said cam will strike against the weighted lever C adjacent to its fulcrum and effect the raising of its weighted end. This cam is removable and cams of different shape can be substituted according to the time it is desired should elapse between the locking and unlocking of the safe. The gear-wheel E intermeshes with two gear-wheels g both of which are on the same arbors with the hour wheels G of the clock-gearings. Each of these hour wheels has a ratcheted hub g' with which engage spring pressed pawls or clicks g^2 attached to the inner face of the gear-wheels g. The object of thus connecting the hour-wheels G and gear-wheels g is that in the event of one train of gearing stopping the other can continue to revolve wheel E uninterrupted. The advantage of employing two pawls or clicks is that should one break the other will preserve the integrity of the mechanism. Thus it will be seen that according to the hour at which the cam on wheel E is set for, the working of the clock-gearings will effect the gradual elevation of the sliding bar F as the appointed hour approaches, said bar effecting the complete elevation of the weighted end of said lever and lowering of the locking plate by the hour set.

H designates a spring-pressed rod located in a barrel h and having a coil spring h' bearing against its lower end. The object of this rod is to effect the instantaneous elevation of the weighted lever and lowering of locking plate in the event that either clock-gearing should run down, as might occur where through oversight the gearing has not been wound. This rod is normally held retracted by the hooked end of a lever h^2 fitting in a groove or recess h^3 thereof, a spring h^4 serving to hold said lever in place. A roller h^5 in the upper end of said lever rests upon a lug or lip h^6 of a sliding bar h^7 held by screws h^8 passed through slots h^9. From this bar projects upper and lower pins h^{10}.

On the projecting ends of the arbors i of the main springs I are wheels or disks i', each of which is provided with a projecting tooth i^2 and two adjacent shoulders i^3. The tooth of each wheel is designed to fit into grooves or recesses i^4 of a star-like wheel i^5 loosely mounted on a screw or stud i^6 projecting from wall b^4. Each of these wheels i^5 carries a pin i^7, which pins are designed to come in contact with the pins h^9 of sliding bar h^7 as the main spring of either one of the clocks runs down and thus raise said sliding bar, which will effect the tripping of lever h^2 and permit rod H to fly upward under the action of its coil spring and effecting the raising of the weighted end of the lever C and the lowering of the locking plate. Thus it will be seen I provide against any possible danger of failure of the clock-mechanism to lower the locking plate and rather than depend on one clock mechanism it is far better to remove the locking plate in the event of either clock running down. The toothed-wheels on the arbors of the main-springs will revolve four times to the single revolution of the star-wheels and hence the latter will not effect the tripping of the lever holding the auxiliary rod until the clock mechanism has about run down or the spring entirely unwound.

To further provide against any possible accident consequent upon the accidental stopping of both clocks and the failure of either of the lever-operating rods to work I provide a third or auxiliary clock-mechanism J, which is shown as located between walls b' and b^4 to one side of the auxiliary rod h^7. The wheels comprising this train of gearing are shown in dotted lines.

Upon the arbor J of the hour-wheel is a short hand j', which normally occupies a position to the right of the flanged end j^2 of a sliding bar j^3, which latter is held by screws j^4 passed through slots in said bar. The outer end of this bar j^3 is designed to engage a pin j^5 projecting from the lower end of trip-lever h^2.

K is a weighted lever fulcrumed at k and having its lower end in engagement with the balance wheel k'. The weighted end of this lever normally occupies a position a little to the right of the perpendicular line and holds the mechanism stationary. In the event that the two main-clocks should fail to effect the unlocking of the locking plate, the safe is tilted to one side to a slight extent sufficient to cause the weighted lever K to swing on its pivot and release its lower end from engagement with the balance wheel and thus permit the auxiliary clock mechanism to work. The short hand j' then begins to travel around and strikes against the end of sliding-bar j^3, which will move said bar and effect the tripping of lever h^2, permitting auxiliary rod h^7 to fly upward and raise the weighted end of the lever and thus remove the locking plate and permit of the opening of the safe.

The advantages of my invention are apparent to those skilled in the art to which it appertains and it will be specially observed that I have provided simple and efficient mechanism, first, for automatically effecting the unlocking of the locking-plate at a pre-determined time, second, to effect the automatic unlocking of such plate in the event that either one of the main clocks should run down and, third, to enable the operating of said locking plate should both of said main clocks fail in their operation or cease to work. Thus

it will be seen that I have produced simple and highly efficient mechanism for accomplishing these results and providing against all possible contingencies.

I claim as my invention—

1. The herein-described improved time-lock for safes, comprising a lever and a locking plate operated thereby, clock mechanism, a main gear-wheel located between and operated by both of said clock mechanism, a cam carried by said main gear-wheel, and a sliding bar in engagement at one end with said cam-wheel, its other end being designed to engage said lever at one side of its fulcrum, substantially as set forth.

2. The herein-described improved time-lock for safes, comprising a weighted lever and a locking plate operated thereby, two trains of clock gearing having each a loose wheel free to move independent of said clock-gearing, a main gear-wheel located between said clock-mechanism and engaged by said loose wheels, a cam carried by said gear-wheel, and a sliding bar in engagement at one end with said cam-wheel and designed to engage and operate said lever, substantially as set forth.

3. The herein-described improved time-lock for safes, comprising a weighted lever and a locking plate operated thereby, clock gearing, an auxiliary spring pressed bar, and trip mechanism between said bar and clock gearing, whereby as the latter runs down said bar will be operated, substantially as set forth.

4. The herein-described improved time lock for safes, comprising a weighted lever and locking plate operated thereby, two main clock gearings, a sliding bar designed to be operated thereby, an auxiliary spring-pressed bar, an auxiliary clock-gearing, and trip mechanism between the latter and said bar, said auxiliary clock gearing being designed to operate in the event of failure of either of the said clock-gearings to operate said weighted lever, substantially as set forth.

5. The combination with the lever and the locking plate operated thereby, of the clock gearings, the main gear-wheel operated thereby and carrying a removable cam, and the sliding bar having a roller in its lower end in engagement with said cam, substantially as set forth.

6. The combination with the lever and the locking plate operated thereby, of the two clock-gearings having their hour wheels provided with ratcheted hubs, the gear-wheels on the arbors of said hour-wheels and having spring-pressed pawls or clicks in engagement with said ratcheted hubs, the main gear wheel operated by said loose wheels, the cam carried by said main gear-wheel, and the sliding bar having its lower end in engagement with said cam and designed to bear against said lever, substantially as set forth.

7. The combination with the lever and the locking plate operated thereby, of the two clock-gearings having the arbors of their main springs provided with wheels or disks having each a tooth projecting therefrom, star wheels adjacent to said former wheels or disks carrying each a pin or projection, a sliding bar having pins or projections designed to be engaged by said pins of said star-wheels, the auxiliary spring-pressed rod, and the trip-connection between said spring-pressed rod and sliding bar, substantially as set forth.

8. The combination with the lever and the locking plate operated thereby, of the two clock-gearings having the arbors of their main springs provided with wheels or disks having each a tooth projecting therefrom, star-wheels adjacent to said former-wheels or disks carrying each a pin or projection, a sliding bar having pins or projections designed to be engaged by said pins of said star-wheels, the auxiliary spring-pressed rod having a groove or recess, the trip lever having one end in engagement with said groove or recess, its other end being in engagement with said sliding bar, and the spring bearing against said trip-lever, substantially as set forth.

9. The combination with the lever, and the locking plate operated thereby, of the spring-pressed rod, the trip lever in engagement therewith, the auxiliary clock-gearing normally held stationary, whereby said auxiliary clock gearing is only free to operate when the safe is tilted, and the movable connection with said trip-lever designed to be operated by the hour hand of said auxiliary clock gearing, substantially as set forth.

10. The combination with the lever and the locking plate operated thereby, of the spring pressed rod having a groove or recess, the trip lever having a hooked end in engagement with said groove or recess, the sliding bar designed to engage said trip-lever, the auxiliary clock gearing having an hour-hand designed to come in contact with said sliding bar, and the weighted lever normally in engagement with the balance wheel of said auxiliary clock-gearing, substantially as set forth.

11. The herein-described improved time-lock for safes, comprising the locking plate for engaging one of the locking bolts, the weighted lever having a roller in one end in engagement with said locking plate, the two main clock-gearings having each a loose wheel moved by the hour-wheel thereof, the main gear-wheel, the cam on the arbor thereof, the sliding bar having a roller in its lower end in contact with said cam, the wheels or disks on the arbors of said clock-gearings having each a tooth, the star-wheels having each a pin and engaged by said teeth, the sliding bar having pins designed to be engaged by said former pins, the spring-pressed trip-lever having one end in engagement with said sliding bar, the auxiliary spring-pressed rod nor-

mally held depressed by said trip-lever, the sliding bar designed to engage said trip lever, the auxiliary clock-gearing having an hour hand designed to move said sliding bar, and the weighted lever normally holding said auxiliary clock-gearing stationary, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

EARL B. WOODWARD.

Witnesses:

HOLMES E. OFFLEY,

WM. S. HODGES.

(No Model.) 2 Sheets—Sheet 1.

H. C. HAIN.

ELECTRIC PROGRAM CLOCK.

No. 496,258. Patented Apr. 25, 1893.

Fig. 1

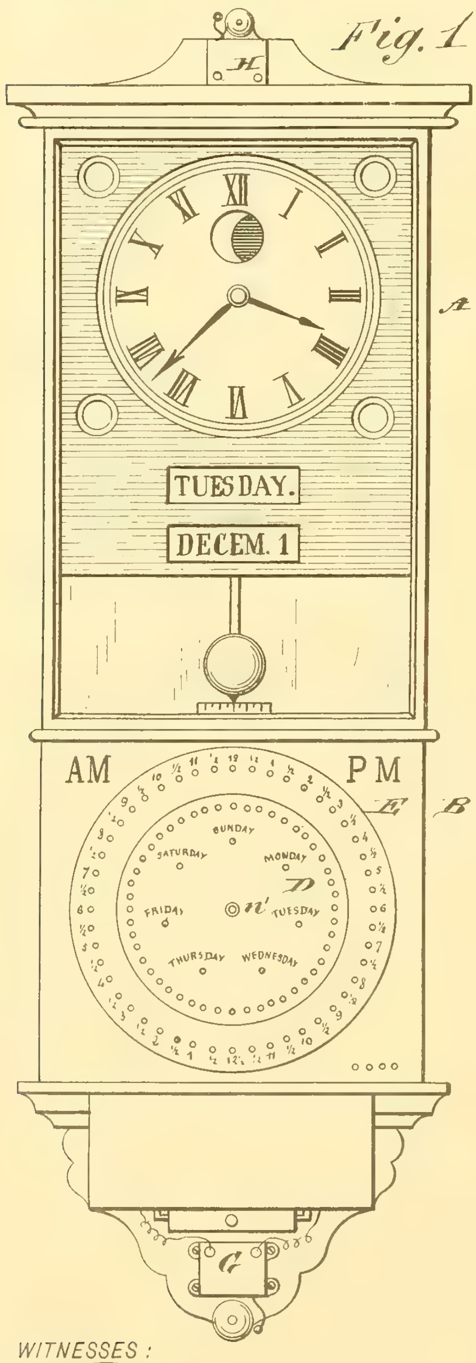
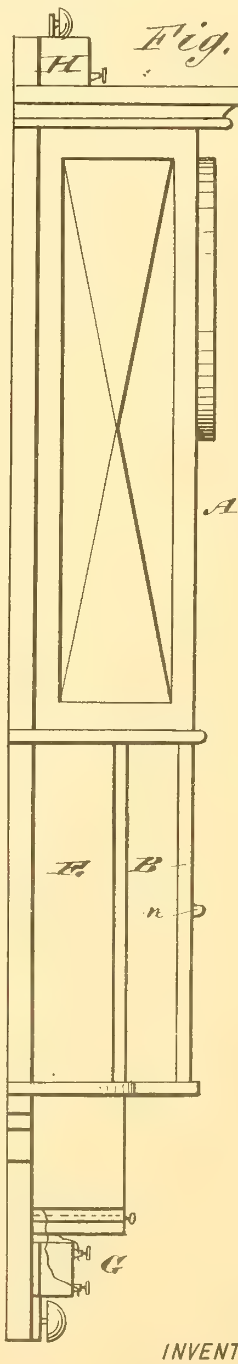


Fig. 2



WITNESSES:

C. Neveux

C. Sedgwick

INVENTOR

H. C. Hain

BY Munn & Co

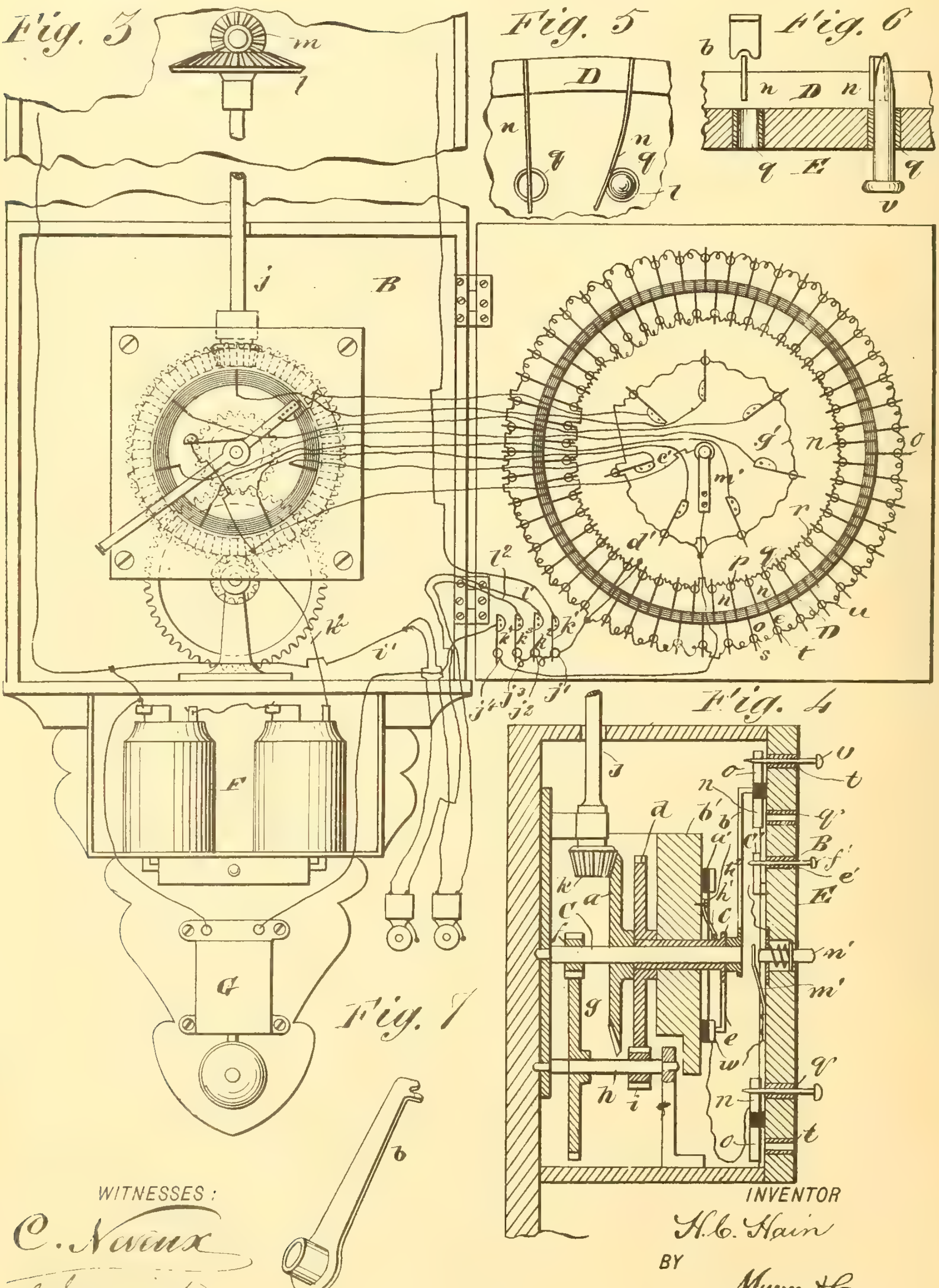
ATTORNEYS.

(No Model.) 2 Sheets—Sheet 2.

H. C. HAIN.

ELECTRIC PROGRAM CLOCK.

No. 496,258. Patented Apr. 25, 1893.



WITNESSES:

C. Naux

C. Sedgwick

INVENTOR

H. C. Hain

BY

Munn & Co

ATTORNEYS.

UNITED STATES PATENT OFFICE.

HENRY C. HAIN, OF BOONEVILLE, MISSOURI.

ELECTRIC PROGRAM-CLOCK.

SPECIFICATION forming part of Letters Patent No. 496,258, dated April 25, 1893.

Application filed April 18, 1892. Serial No. 429,582. (No model.)

To all whom it may concern:

Be it known that I, HENRY C. HAIN, of Booneville, in the county of Cooper and State of Missouri, have invented a new and Improved Electric Program-Clock, of which the following is a specification, reference being had to the annexed drawings, forming a part thereof, in which—

Figure 1 is a front elevation of my improved electric reminder. Fig. 2 is a side elevation. Fig. 3 is an enlarged partial front elevation showing the apparatus with the door open. Fig. 4 is a vertical transverse section of the contact mechanism. Fig. 5 is an enlarged detail rear elevation of a portion of the contact dial. Fig. 6 is a transverse section of the same; and Fig. 7 is a detail view of one of the contact arms.

Similar letters of reference indicate corresponding parts in all the views.

The object of my invention is to construct an electrical attachment for a clock, for giving calls at different times in the day and different days in the week, as a reminder of engagements, &c.

The invention will be first described and then pointed out in the claims.

The clock A, is of ordinary construction and will therefore require no particular description.

To the lower end of the clock case is attached an auxiliary case B, in which is journaled a shaft C, carrying a bevel wheel a, and a contact arm b. Between the said bevel wheel a and contact arm b, and upon the shaft C, is placed a sleeve c, to which is secured a spur wheel d and a contact arm e. To the said shaft C, is also attached a pinion f, which engages a spur wheel g on the shaft h, journaled in the auxiliary casing B, and carrying the pinion i. The said pinion i engages the spur wheel d.

In the clock case and in the auxiliary case B, is journaled a shaft j, provided at its lower end with a bevel pinion k, which engages the bevel wheel a on the shaft C. The upper end of the shaft j is provided with a bevel wheel l, which is engaged by a bevel pinion m on the minute hand arbor of the clock A. The gearing just described is proportioned so that the shaft C makes a revolution once in twenty-four hours, while the sleeve c makes a revolution once in seven days.

The end of the arm b is angled and notched, as shown in Fig. 7, and in the path of the said notched end of the arm b, are arranged contact springs n, o, which alternate with each other and are inserted on radial lines in an insulating annular support D, secured to the back of the dial E. The inwardly-projecting contact springs n project over apertures p formed in the dial E, and bushed with metallic bushings q, the entire series of bushings q in the said apertures being connected together in series by a wire r. In a similar manner the springs o, which project outwardly from the insulating support D, project over apertures s, in which are inserted bushings t, and the said bushings t are all connected together in series by a wire u. Pins v, having pointed ends, are fitted to the bushings q, t, so that when a pin is inserted in one of the bushings, it touches one of the springs n or o, and makes an electrical connection between the said spring and the bushing. The notched end of the contact arm b makes two contacts with each spring before passing to the next in order, thereby giving two alarms as will presently be described.

The arm e is angled at its free end, and is arranged to touch the contacts w inserted in the angled insulating support a', secured to the plate b' which supports the sleeve c. There are seven contact bars w, corresponding to the seven days of the week, and each of the said contact bars is connected with a spring c' on the back of the dial E. The said springs c' project over apertures d', in which are inserted metallic bushings e', to which are fitted pointed pins f'. The bushings e' are connected in series by the wire g'. The bushings e' represent the days of the week upon the dial E. A spring h', attached to the plate b', presses on the sleeve c, and is connected by a wire h^2 with one pole of the battery F, placed in the lower compartment of the case B, the other pole of the said battery being connected with the bell G, below the said auxiliary casing, and another bell H at the top of the clock casing, also with a wire i',

extending [illegible] case to [illegible] distant bells.

In the front of the auxiliary casing B, are inserted metallic bushings j', j^2, j^3 j^4, over which extend springs k', k^2, k^3, k^4, the spring k' being connected electrically with the bell H at the top of the clock, the spring k^4 being connected electrically with the bell G, and wires i'', i extend from the springs k^2, k^3 to the distant bells which are connected with the wire i'. The bushings j', j^2, j^3 are connected together and with the wires u, r. The bushing j^4 is connected electrically with the wire g' and with the spring m' of the push button n' at the center of the dial.

The outer row of bushings t of the dial represents the hours and half hours, and the inner row of bushings q, the quarter hours or the intermediate half hours. A call for any day of the week is insured by the insertion of a pin f' in the bushing e' located under the name of the day; a call for any hour, half hour or quarter hour in the twenty-four is insured by the insertion of a pin in one of the bushings q or t. By inserting a pin in the bushing j', thus connecting the wires u, r, electrically with the bell H at the top of the clock, the said bell will ring whenever the contact is made with the hour, half hour, or quarter hour spring which is thrown in the circuit by the insertion of the pin f'. When the arm e makes a contact with one of the contact bars w, it gives an alarm on the bell G, providing a pin f' is in one of the bushings e', and the arm b closes the electric circuit on the bell H, providing a pin v is in one of the bushings q, t, the alarm corresponding with the time represented by the position of the pin v on the dial. An alarm is insured upon one of the distant bells by the insertion of a pin in one of the bushings j^2, j^3. When a local call is required, the push button n' is used, thereby closing the circuit on the bell G, and giving an alarm. The arm b which contacts with the spring n o by virtue of its notched end makes two contacts with each spring at each revolution, thus causing a double alarm to be given, which insures attention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination with a clock, of an auxiliary dial provided with a series of openings, a series of equidistant electrical contacts arranged in a circle on the inside of the dial, and opposite the openings thereof, a contact arm adapted to close an electric circuit, mechanism between the clock and arm for operating the latter from the former, and removable pins adapted to be inserted in the openings in the dial, substantially as and for the purpose set forth.

2. The combination with a clock, of an auxiliary case provided with a dial having openings therein, a series of contact springs representing the fractions of a day, a series of contact springs representing the days of a week, said contact springs being within the auxiliary case, mechanism between the clock and arms for operating the latter from the former, and removable pins adapted to be inserted in the openings of the dial to engage the said contact springs, substantially as described.

3. The combination with a clock, and electric alarm bells, of an auxiliary case provided with a dial having openings, said openings being provided with metal bushings connected together, a series of contact springs representing the fractions of a day, a series of contact springs representing the days of a week, said contact springs being within the said case, contact arms, mechanism between the said arms and clock for operating the former from the latter, and pins adapted to be inserted in the openings of the dial to engage the contact springs, substantially as herein shown and described.

4. The combination with a clock provided with an auxiliary case having a dial provided with metal lined apertures connected together, of a series of contact springs representing the fractions of a day, a series of contact springs representing the days of the week, contact arms mounted in the auxiliary case, mechanism for operating the said arms from the clock, said mechanism causing one arm to make a revolution once in twenty-four hours and the other to make a revolution once a week, and pins adapted to be inserted in the apertures of the dial and engage the said contact springs, substantially as described.

5. The combination with a clock provided with an auxiliary case having a dial provided with metal lined apertures connected in series, and electric bells, of contact springs n o on the dial and projecting over some of the apertures of the said dial, contact bars w secured to a support in the auxiliary case, contact springs c' on the dial projecting over some of the apertures thereof and connected with the bars w, contact arms b c in the auxiliary case, mechanism operated by the clock for causing one arm to make a revolution once in twenty-four hours and the other to make a revolution once a week, and pins adapted to be inserted in the apertures of the said dial, substantially as herein shown and described.

6. The combination, with a series of bushings connected electrically with each other and with the battery and call bell, of a series of contact springs extending over the bushings, and conically pointed pins for insertion in the bushings for completing the electric circuit between the contact springs and the bushings, substantially as specified.

7. The combination, with a clock, of an aux-

iliary movement provided with two arms, one arranged to make a revolution once in twenty-four hours the other being arranged to make a revolution once in a week, series of electric contacts arranged to be touched by the arms, removable circuit closing pins for engaging said contacts electric alarm bells, and the electric connections, substantially as specified.

HENRY C. HAIN.

Witnesses:
L. H. LEVENS,
A. H. STEPHENS.

(No Model.) 3 Sheets—Sheet 1.

J. C. HINCHMAN.

AUTOMATIC TIME PRINTER AND INDICATOR.

No. 496,310. Patented Apr. 25, 1893.

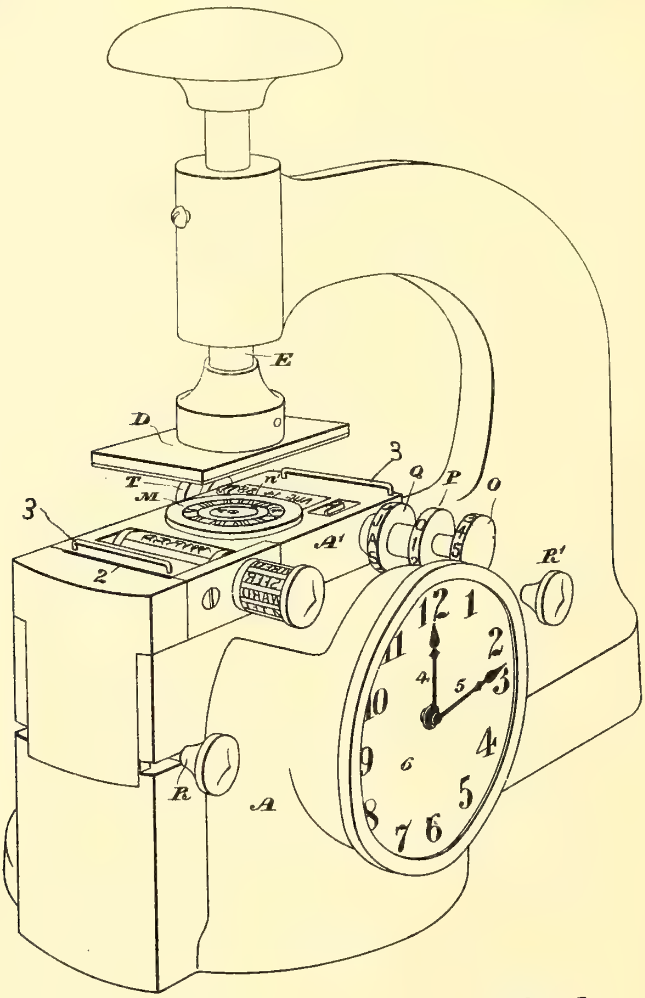
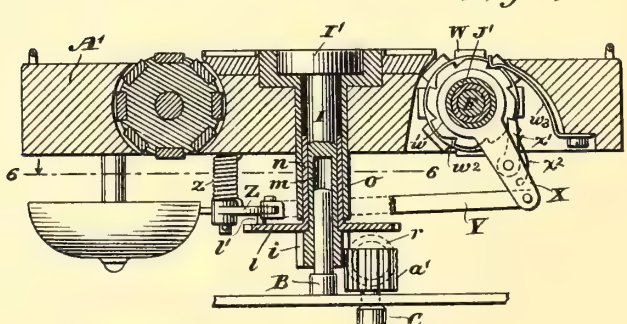


Fig. 1.

Fig. 5.



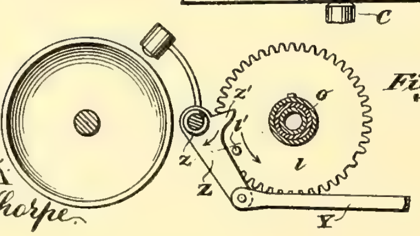


Fig. 6.

Witnesses
Geo. W. Breck
Edward Thorpe.

Inventor
John C. Hinchman

(No Model.) 3 Sheets—Sheet 2.

J. C. HINCHMAN.

AUTOMATIC TIME PRINTER AND INDICATOR.

No. 496,310. Patented Apr. 25, 1893.

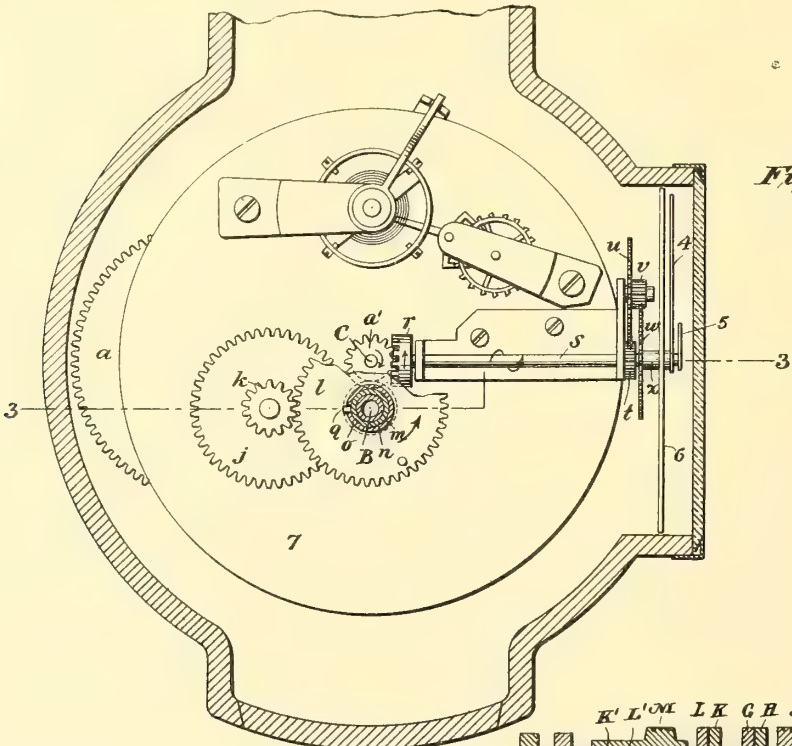
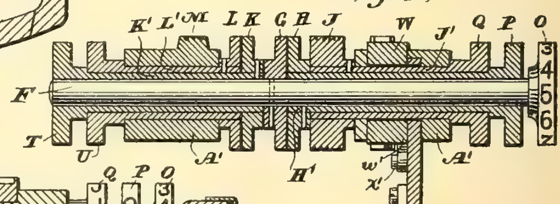


Fig. 2,

Fig. 4,



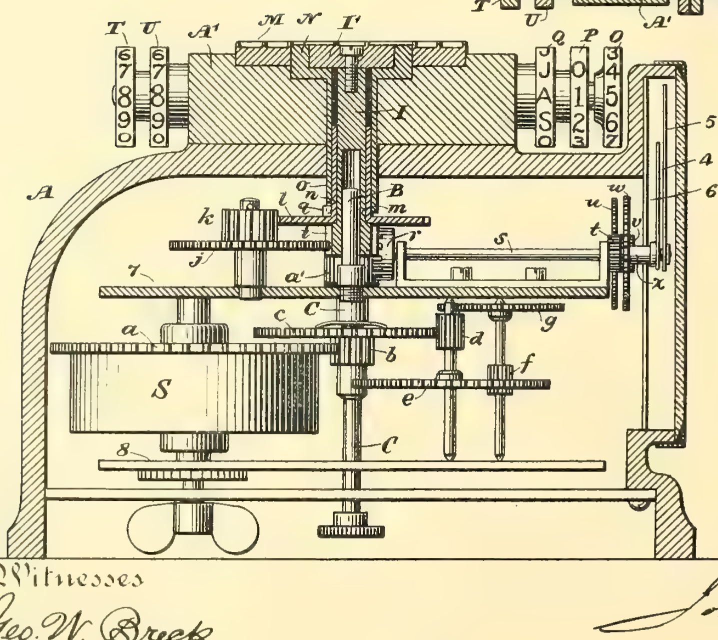


Fig. 3,

Witnesses

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Edward Thorpe

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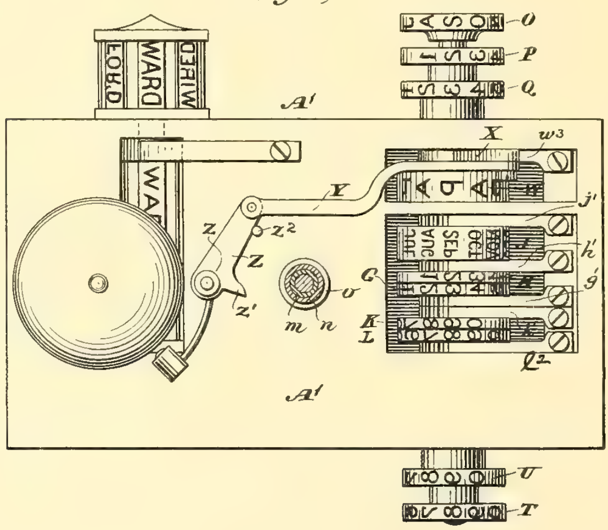
AUTOMATIC TIME PRINTER AND INDICATOR.

No. 496,310. Patented Apr. 25, 1893.

Fig. 7.



Witnesses

Geo. W. Breck.

Henry W. Boll

John C. Hinchman Inventor

By his Attorney

G. N. Stockbridge

UNITED STATES PATENT OFFICE.

JOHN C. HINCHMAN, OF SUMMIT, NEW JERSEY.

AUTOMATIC TIME PRINTER AND INDICATOR.

SPECIFICATION forming part of Letters Patent No. 496,310, dated April 25, 1893.

Application filed August 9, 1889. Serial No. 320,305. (No model.)

To all whom it may concern:

Be it known that I, JOHN C. HINCHMAN, a citizen of the United States, residing at Summit, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Automatic Time Printers and Indicators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

To insure accuracy in the operation of time stamps, it is found desirable to combine therewith a time indicator, which is operated by the same mechanism as that which controls the movements of the time printing machinery. It is true that in such a case the presence of the time indicator exercises no actual control over the time stamp apparatus, but it does serve to call attention to any variation from accuracy in the time printing machinery, and when regulated by standard time, serves as an assurance that the stamping apparatus is in proper condition. At the same time, it is preferable that the time indicator mechanism should be subordinate, and that the driving mechanism should be applied primarily to the stamp timing machinery. The time indicator will then be regulated intermediately, that is, through the controlling mechanism of the stamp. Now, in apparatus of this class, where the matter to be printed is arranged upon the peripheries of moving wheels; that is, where the movements of the driving mechanism are in the same direction as that of the hands of the timepiece, this is a thing which can be easily accomplished. But in practice, time stamping machines are now constructed according to the type in which the moving part or parts of the stamp, and some of the other significant parts are arranged concentrically. With such a construction the movements of the indicating hands are in a reverse direction to those of the moving parts of the stamp. Accordingly, it becomes a matter of more difficulty to make such connections as shall combine the whole apparatus into a unit, and at the same time give due prominence to the stamping machinery. I have accomplished this result by gearing the minute hand spindle of a time indicator to the center arbor of the stamp driving mechanism by a crown wheel and pinion connection, as will appear hereinafter. By these means I am not only enabled to secure an efficient apparatus, but I also obtain simplicity and compactness of construction to a degree otherwise not possible. Beyond this, I have introduced certain novel features in the gearing of my time stamping machinery and in the mechanical construction of the stamp, as will appear from the specification which follows.

The letters and figures constituting the significant parts of my stamping apparatus are mounted, in the present instance, in and on a removable plate which forms the top of the entire closing chamber of the apparatus, and at the same time serves as a printing bed.

In the form of apparatus illustrated and described in the present application, I arrange upon a fixed dial on the printing bed Roman numerals from I to XII to indicate the hours of the day. Within an opening in this dial is a smaller dial, which carries a pointer corresponding to the hour hand of a clock. This second dial makes a complete rotation under the influence of clock mechanism, once every twelve hours, and within it is another rotating dial having a pointer corresponding to the minute hand of a clock. The latter dial makes a complete rotation once every hour.

My meridian apparatus, that is, the devices for indicating the changes from a. m. to p. m. is mounted upon a transverse shaft, which also carries wheels with letters and numerals for indicating the months, days and years. The whole constitutes what I call my universal date apparatus. The different wheels, with one exception, are mounted directly upon sleeves which the mentioned shaft traverses. The universal date apparatus is located at one end of the top plate, while at the opposite end is a transverse shaft or roller, provided with spaces for other significant words or characters. Both devices, with the exception of the meridian apparatus, are designed to be operated by hand and are retained in place after each operation by suitable clicks. The meridian wheel is operated automatically, as will appear.

I have illustrated my invention in the accompanying drawings, in which—

Figure 1 is a perspective of my printing and indicating apparatus. Fig. 2 is a horizontal section taken just above the spindle of the minute hand of the timepiece. Fig. 3 is a vertical section along the line 3—3 of Fig. 2. Fig. 4 is a section of my universal date apparatus. Fig. 5 is a central cross section of the removable top plate of the stamping apparatus. Fig. 6 is a section taken on line 6—6 of Fig. 5 and, Fig. 7 is a bottom plan of the top plate.

Referring to the drawings by letters and numerals, A is the casing of my time printing and indicating apparatus, and A′ the top plate thereof. Raised slightly above the surface of the top plate are characters in type, over which an ink ribbon is adapted to be drawn. The ribbon (not shown in the drawings) is wound upon rollers, R, R′, which extend transversely through the chamber of the casing A. The rollers are provided with thumb pieces outside the casing, by means of which they may be rotated for feeding the ribbon. In passing from one roller to the other, the ribbon traverses suitable slits and guides in and on the top plate A′. One of the slits is shown at 2, and the guides are designated by the characters 3, 3. Between the guides the ribbon passes over the characters in type already mentioned. Above these is a platen or printing pad D attached to a push-rod E, which is supported on a curved extension of the casing A, as clearly shown in Fig. 1.

The characters in type which project slightly above the surface of the top plate, constitute the significant parts of my time printing apparatus, and they are operated, some of them by hand, and some of them by automatic mechanism. They are arranged as shown, in a horizontal position, and the process of printing is accomplished by placing the paper on which a record is to be made between the printing pad and the ink ribbon, and then pressing the pad down by means of the push-rod. The automatic mechanism which operates the moving parts of the time printing apparatus, serve also to actuate the hands 4 and 5 of the time indicator, the dial 6 of which is located in a vertical position within an opening in one side of the casing A. Thus the printing devices and the time indicating apparatus are both arranged in the most convenient position, the one for taking an impression of the time and the other for easy inspection.

I will first describe the automatic apparatus and afterward that which is operated by hand. The clock mechanism is located within the casing A, and is in this instance applied directly to the moving parts of the time stamp, and indirectly to the time indicating apparatus. It is supported between top and bottom plates 7 and 8 respectively, and is driven by a suitable spring S. Through a cog wheel *a* and a pinion *b*, movement is communicated to the center arbor C, on which the mentioned pinion is mounted. The center arbor is connected with suitable escapement devices, through the train of wheels and pinions *c*, *d*, *e*, *f*, *g*. A pinion *a′* secured to the center arbor above the plate 7, engages with a pinion *i*, which is secured to the lower end of a hollow post I. The said post is slipped over an independent standard B, and has its bearing thereon. Outside the post I is a sleeve *n* on which is a cog wheel *l*. Motion is communicated to this wheel and sleeve through the gear wheel *j* and elongated pinion *k*. Near the hub of the wheel *l* is a pin *q*. This is adapted to engage with a notch in the bottom of a sleeve *o*, which surrounds the sleeve *n* and carries at its upper end a dial N having a pointer *n′*. The relations of the parts are such that the dial I′ will be caused to rotate once every hour, while the dial N will make a complete revolution once in twelve hours. The two dials are concentric, and are surrounded by a dial M, fixed to the top plate A′, and provided with Roman numerals from I to XII, for indicating the hours of the day. The dials M, N, and I′ correspond respectively to an ordinary clock dial, an hour hand, and a minute hand; or, more strictly, the last two devices are represented by the pointers on the dials N and I′. The pinions *i* and *k* are elongated in order to insure their engagement with the co-operating gear wheels, in spite of any inequalities in the bearing surfaces on which the dials N and I′ rest.

The movements for my time indicating apparatus are taken off the pinion *a′* through the medium of a crown wheel *r* on the spindle *s* of the minute hand 5. Motion is communicated to the hour hand 4 on the sleeve *x* through the gearing *t*, *u*, *v*, *w*.

By the means of the construction described, I am able to make a time indicating and printing apparatus which shall be very compact. The clock mechanism, for the most part, occupies the space under the top of printing plate, while, for the time indicating apparatus, I need only employ such space as is necessary for a dial and indicating hand and a glass protecting case. Most of the other significant parts of my time stamping apparatus, are operated by hand, and their construction will now be described.

Near one end of the top plate A′ is an opening through which project wheels or dials, carrying characters in type for indicating the months, days and years. The type characters project far enough to be in a suitable position for printing, and are, in fact, on the same level with the characters on the dial M and the pointers on the dials N and I′. The wheels referred to are mounted on a transverse shaft F, which has its bearings in the top plate. The same shaft carries a meridian wheel for indicating the transition from a. m. to p. m. I prefer to arrange the character M in a fixed position on the top plate and to provide what I have called my meridian wheel, with the characters A and P alternately, and I have illustrated this construction in the drawings.

The details of the apparatus just referred to are shown in Fig. 4. While I have said that all the wheels are mounted on the shaft F, this is strictly true only of the wheel G which bears figures representing the units of the numbers which indicate the days of the month. The other wheels are mounted on sleeves, surrounding the shaft F. For example, the wheel H, or tens wheel, of the numbers which indicate the days of the month, is secured to a sleeve H′, next to the shaft. The wheel J, which carries letters for indicating the months, is secured to a sleeve J′ outside the sleeve H′. The latter sleeve covers only about one-half the length of the shaft F, the other half being covered by a sleeve K′, to which is secured a wheel K, for indicating the tens of the numbers which represent the years. Outside the sleeve K′ is another sleeve L′ to which is attached a wheel L, carrying figures for indicating the units of the said numbers. Now, all the above mentioned wheels are located in such a position that their rims or peripheries are under the printing ribbon. This being the case, it is necessary to provide some means for operating them from the outside, and for holding them in place when they have been brought to the right position. At the outer right hand of the shaft F is secured a disk or wheel O having on its periphery numbers corresponding precisely in order and position with any chosen numeral in position for printing. Similarly, and for the same purpose, wheels P, Q, T, and U are secured to the outer ends of the sleeves H′, J′, K′ and L′ respectively. These wheels are all located outside the top plate, in positions where they can be easily reached by the hand, and they are all supplied with letters or numerals corresponding to those on the inner wheels, as will be readily understood. The hubs of the various wheels are supplied with notches corresponding in number and position to the characters on their peripheries and a series of spring clicks g', h', j', k', j^2 and w^3 co-operating with the notched hubs, hold the wheels in position, so that an impression can be taken from them without danger of their being disturbed. The notches and springs are so arranged that the characters on the wheels are held in proper position for printing.

The meridian wheel W is mounted loosely on the sleeve J′ and is capable of independent rotation thereon. This wheel has on its periphery the letters A. and P. arranged alternately. On the wheel W is a hub w', provided with suitable notches w^2. Loosely mounted on the sleeve J′ is an arm X which extends past the hub w' and carries a dog x', which is pressed into one or another of the notches w^2 by a spring x^2. The arm X is connected at its outer extremity by a link Y to the end of a centrally pivoted arm Z, which is mounted on a post secured to the bottom of the top plate A′. A spring z is attached to the top plate and to the arm Z in such a manner as to press the latter in the direction indicated by the arrow in Fig. 6. As a result, the arm X is pressed normally into the position shown in Fig. 5 against a stop z^2. To operate the meridian wheel one step, it is necessary to move the arm X forward against the force of the spring z until the dog x' catches in the notch next succeeding the one in which it may be resting, when, if the arm be released, the meridian wheel will be carried forward one space, and a change will be made in the reading at the top. This action is accomplished every twelve hours through the medium of the following devices:

A projection z' on the arm Z is arranged in the path of movement of a pin l', on the cog wheel l. It is so arranged as to be pressed upon the said pin in its rotation, and to be urged against the power of the spring z until finally it is tripped as the pin passes by. The movement caused by the pin is sufficient to move the arm X far enough to cause the dog to enter the next notch before the tripping takes place. When that happens, the meridian wheel is carried forward, as above detailed.

The arm Z is extended beyond its pivot in the form of a hammer, which is adapted to strike a suitable alarm device y on the return of the arm after being tripped.

I provide an alarm apparatus, as indicated, in order that attention may be called to the change from a. m. to p. m. by an audible signal. This change is, of course, an important one, and if attention be called to it by an alarm, the person in charge of the apparatus will be at once notified and can take steps to correct any deviation from actual time, which may have been developed in the apparatus during the preceding twelve hours. To the same end it serves also the time indicating apparatus, which can be referred to at any hour of the day, and which will also call attention to errors in the clock mechanism.

Having now described my invention, what I claim is—

1. The combination with type-dials forming part of a time printing apparatus, and a suitable motor therefor, and intermediate gearing the shafts of which are parallel with each other and with the motor shaft, of a visual dial and pointers traversing the same, the axes of the pointers being at right angles or substantially so to the shafts before mentioned, whereby the time indicating apparatus is subordinated to the automatic time stamping apparatus, substantially as set forth.

2. In a time printing apparatus, a meridian wheel mounted on a suitable shaft, a printing ribbon passing over the said wheel, and a stamp, as described, in combination with an alarm, and with clock mechanism for moving the meridian wheel step by step, the hammer of the alarm being operatively connected with the step by step mechanism, whereby attention will be called every time the meridian wheel is operated.

3. In a universal date apparatus, the combination of a top plate, a series of horizontally rotating type-wheels countersunk within said plate for indicating the smaller divisions of time, as hours and minutes, a horizontal aperture formed within said plate, a shaft centrally arranged within said aperture, a type-wheel placed near the middle of said shaft, a series of unit wheels and sleeves mounted upon said shaft and arranged upon either side of said central wheel for indicating the days of the month, the year or other divisions of time, and a slot in the upper surface of said top plate communicating with said horizontal aperture through which the peripheries of said type-wheels arranged upon said horizontal shaft project, as and for the purpose set forth.

In testimony whereof I have affixed my signature in presence of two witnesses.

JOHN C. HINCHMAN.

Witnesses:

G. H. STOCKBRIDGE,

H. W. HELFER.

(No Model.)

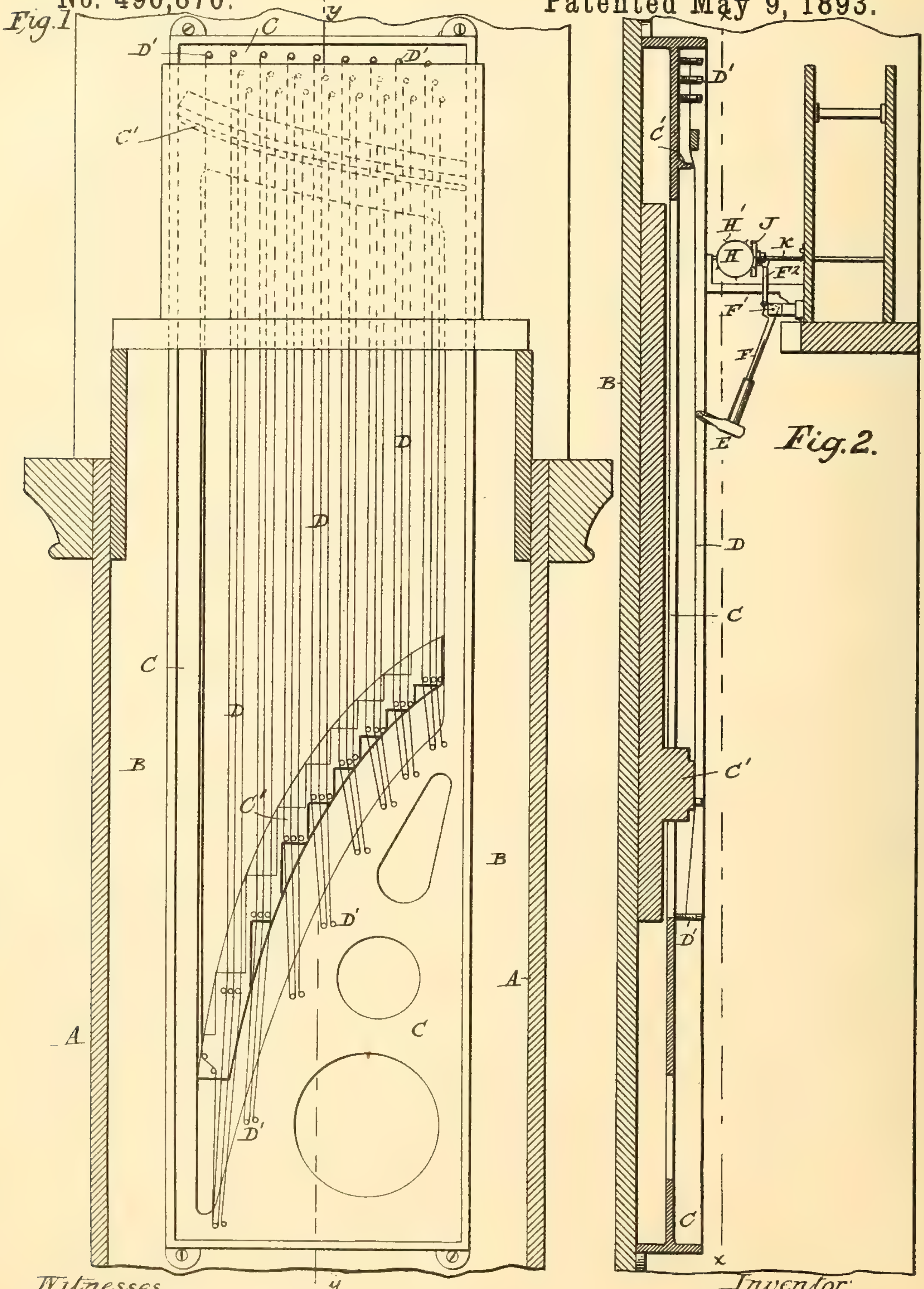
2 Sheets—Sheet 1.

J. J. ELLIOTT.

CHIMING CLOCK.

No. 496,870.

Patented May 9, 1893.



Witnesses
Sidney P. Hollingsworth
Milton O'Connell

Inventor;
James J. Elliott
by his attorneys
Baldwin Davidson & Wight

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

J. J. ELLIOTT.

CHIMING CLOCK.

No. 496,870. Patented May 9, 1893.

Fig. 3.

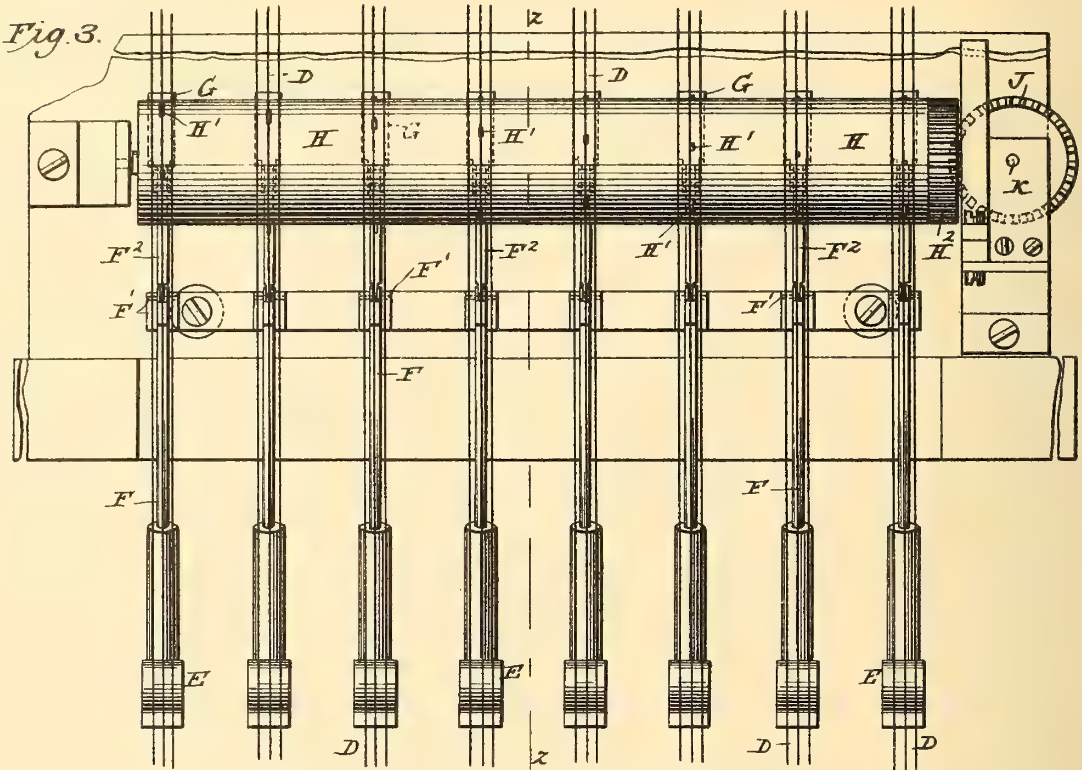
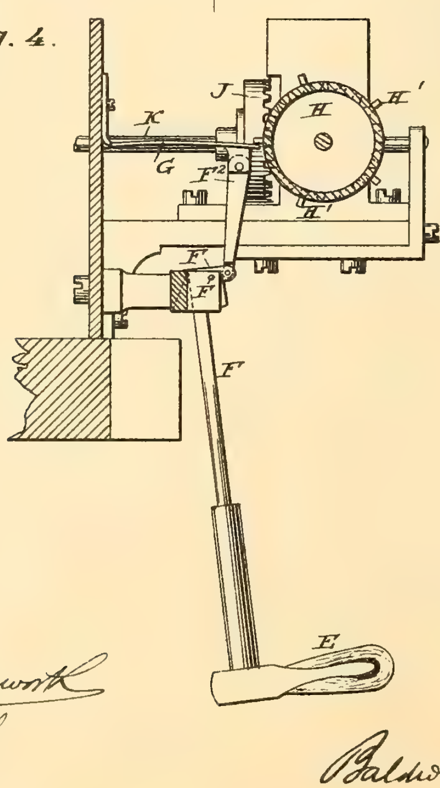


Fig. 4.



Witnesses,

Sidney P. Hollingsworth

Milton O'Connell.

Inventor,

James J. Elliott

by his attorneys

Baldwin, Davidson & Wight.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JAMES JONES ELLIOTT, OF LONDON, ENGLAND.

CHIMING-CLOCK.

SPECIFICATION forming part of Letters Patent No. 496,870, dated May 9, 1893.

Application filed March 25, 1892. Serial No. 426,462. (No model.)

To all whom it may concern:

Be it known that I, JAMES JONES ELLIOTT, a subject of the Queen of Great Britain, residing at London, England, have invented certain new and useful Improvements in Clocks, of which the following is a specification.

My invention relates to chiming clocks, or those in which heretofore a series of bells, gongs, or tubes has been employed in connection with the striking mechanism. Instead of employing bells, gongs, tubes or wire free at one end, such as coiled wires, I employ stretched wires fixed at both ends. The hammers of the clock being suitably arranged to sound them to give the desired note. By employing strained wires fixed at both ends, I obviate the objectionable over-tones heretofore incident to the use of bells, gongs, &c. These over-tones or harmonics are so prominent in bells, gongs or tubes that it has been found almost impossible to produce a perfect octave, and so, to a musical ear, they are very objectionable. While, of course, there are over-tones present when strained wires are employed, yet they are so reduced as to be free from harshness and objectionable discord. I obtain the requisite volume of sound by a series of wires, and there is less strain on the mechanism than heretofore encountered, in consequence of less weight being necessary to produce the same volume of tone, and the wear and tear on the works of the clock are greatly reduced. I arrange the wires in sets or groups and secure them on a frame having bridges and tightening pins. This frame is arranged in the clock case in such manner as to hold the wires in a vertical position. The tightening pins are arranged within convenient reach of the operator in tuning the chimes. The hammers of the clock are arranged on horizontal pivots, from which they depend, and are operated by the pin-barrel, which is part of the chiming train of the clock.

The details of the best way of carrying out my invention will be hereinafter more fully described.

In the accompanying drawings,—Figure 1 is a vertical section of part of a clock embodying my invention on the line x—x of Fig. 2. Fig. 2 is a vertical section on the line y—y of Fig. 1. Fig. 3 is an elevation of part of the chiming mechanism, on an enlarged scale, and Fig. 4 is a section on the line z—z of Fig. 3.

In the drawings, A, indicates the clock case, and C, indicates a frame secured to the back B, of the case. This frame is provided with bridges C′. over which the wires D, extend. The wires are secured at each end to tightening pins D′. As shown, the wires are arranged in groups or sets. The drawings show a series composed mainly of sets or groups of three wires. All the wires in each set or group are adapted to be struck by a single hammer and give the same tone. By this arrangement, a much better tone is obtained.

The frame carrying the wires is adapted to be arranged vertically in the clock case, and to be secured to the back thereof, in rear of the pendulum weights and the works. The shaft K, on the striking side of the clock-works, carries a gear-wheel J, meshing with teeth H^2, on a cylinder H, carrying pins H′. At each quarter of the hour or other pre-determined interval, the cylinder is actuated, as is usual in chiming clocks. The hammers E, are secured to arms F, of bell-crank levers pivoted on horizontal pivots F′. Rods F^2, are pivotally connected with the shorter arms of the bell-crank levers, and, at their upper ends, are secured to springs G, fixed to the clock case, or to the case or frame of the clock-works. It will be observed that the hammers are located below the pin-barrel or cylinder and below the clock-works. The pins H′ are adapted to engage with the springs in such manner as to depress the rods F^2, and to deflect the hammers to cause them to recede from the wires. When the pins have passed the ends of the springs, the hammers are returned to give a quick, sharp blow to the wires to sound the notes. By the vertical arrangement, I can employ a large number of wires in the clock-case, and make them of the requisite length to give the desired notes, and the wires, by this vertical arrangement, being arranged side by side, the hammers may be placed close together and in convenient position to be operated upon by their actuating mechanism.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of a clock case, a frame

secured within the clock case, a series of strained wires fixed at both ends to the frame and arranged vertically thereon, a series of hammers within the clock case, and mechanism operated by the clock works to actuate the hammers to strike the hours and quarter hours upon the strained wires.

2. The combination, substantially as hereinbefore set forth, of a clock case, a frame secured therein and having bridges at its upper and lower ends, a series of sets or groups of wires arranged vertically on said frame, a series of hammers, each of which is adapted to strike all the wires in each group or set, and mechanism operated by the clock works to actuate the hammers.

3. The combination, substantially as hereinbefore set forth, of a clock case, a frame having bridges at its upper and lower ends and secured to the back of the clock case, strained wires fixed at both ends and arranged vertically on the frame, a series of hammers carried by bell crank levers mounted on horizontal pivots, a revolving pin barrel operated by the clock works at pre-determined intervals of time, and connections between the pin barrel and the bell crank levers.

4. The combination, substantially as hereinbefore set forth, of a clock case, a frame secured within the clock case, and having bridges at its upper and lower ends, strained wires fixed at both ends arranged vertically on the frame, a series of hammers mounted on horizontal pivots from which they depend, and connections between the hammers and the clock works.

5. The combination, substantially as hereinbefore set forth, of a clock-case, a frame having bridges at its upper and lower ends and secured to the back of the clock-case, strained wires fixed at both ends, arranged vertically on the frame, the clock-hammers carried by bell-crank levers mounted on horizontal pivots, a series of springs G, rods connecting the springs with the bell-crank levers, and a chiming clock, the barrel or cylinder of which engages with the springs which actuate the hammers.

JAMES JONES ELLIOTT.

Witnesses:

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T. F. BARNES,

17 *Gracechurch Street, London, E. C.*

(No Model.)

W. A. TURBAYNE.

AUTOMATIC SWITCH FOR MAST ARMS.

No. 497,104. Patented May 9, 1893.

Fig. 1.

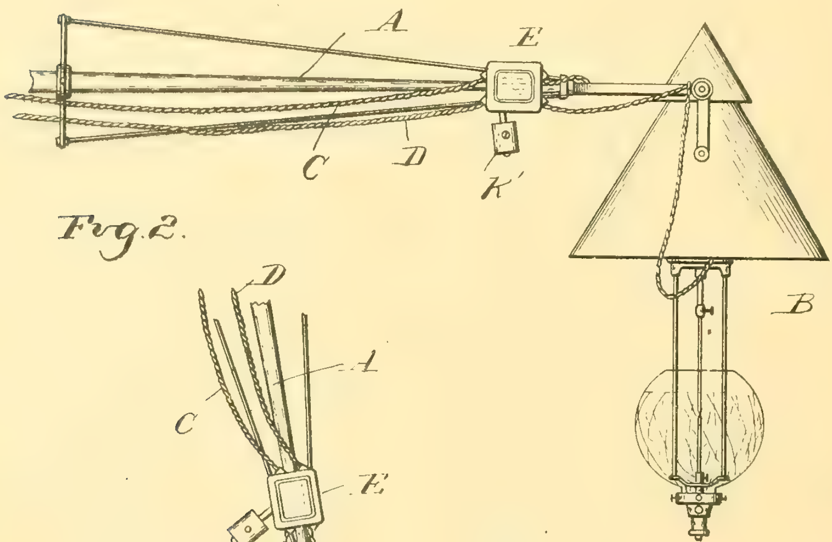


Fig. 2.

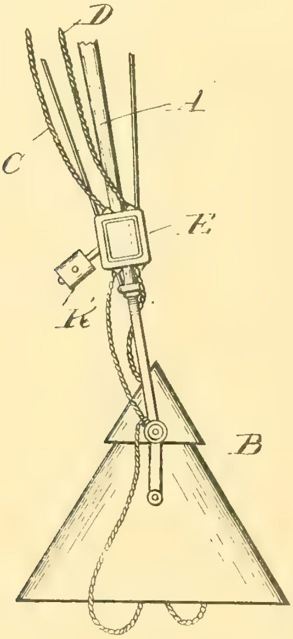


Fig. 3.

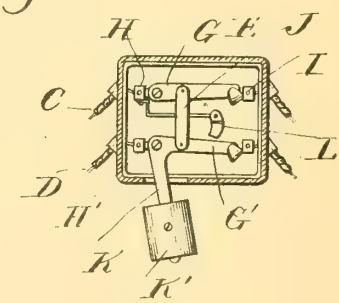
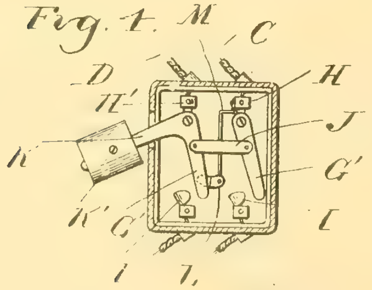


Fig. 4.



Witnesses
A. L. Hobbs
N. L. Lindop

Inventor
William A. Turbayne
By Thos. S. Sprague & Son,
Attys.

UNITED STATES PATENT OFFICE.

WILLIAM A. TURBAYNE, OF DETROIT, MICHIGAN.

AUTOMATIC SWITCH FOR MAST-ARMS.

SPECIFICATION forming part of Letters Patent No. 497,104, dated May 9, 1893.

Application filed November 5, 1892. Serial No. 451,106. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. TURBAYNE, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Automatic Switches for Mast-Arms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention consists in the peculiar construction of an automatic switch designed to cut out an electric arc lamp from the circuit upon the lowering of the mast arm.

The invention further consists in the peculiar construction of the contact arms and a weight acting to normally hold the same in position to complete the circuit to the lamp and for automatically short circuiting the current through the switch upon the lowering of the mast arm, and further in the peculiar construction, arrangement and combination of the various parts all as more fully hereinafter described.

In the drawings, Figure 1 is an elevation of a mast arm showing the lamp in its normal position, as in use. Fig. 2 is a similar elevation showing the lamp lowered. Fig. 3 is a vertical, central section through the switch, the parts being in the position shown in Fig. 1. Fig. 4 is a similar section through the switch showing the parts in the position when the arm is as shown in Fig. 2.

A is a mast arm pivoted to a mast and adapted to be raised and lowered for the purpose of renewing the carbons, &c., in the lamp B which is pivotally suspended at the outer end of the said arm.

C and D are the conductors leading to and from the lamp respectively.

E is a switch box secured preferably near the end of the mast arm and into which these wires lead.

G and G′ are two contact arms connecting the binding posts H and H′ with the contacts I at the opposite end of the switch box.

J is a connecting bar made of insulating material, pivotally connected at each end to the two arms G and G′ respectively.

K is a lever preferably formed integral with the arm G′ having a weight K′ adjustably secured thereon and extending normally in a slightly forward inclined position, so that its weight will act to hold the two arms G G′ tightly against the contacts I, thereby insuring the passage of the current to the lamp notwithstanding vibrations or oscillations of the arm in the wind.

When the arms A are lowered to the position shown in Fig. 2, it is evident that the weight K′ will move forward as the arm lowers rocking the bell crank arm of the lever K and arm G′ and lifting the two arms G G′ from their contacts and both being moved together by means of the connecting bar J. Before the arm G′ breaks its connection with its contact I it will engage upon an intermediate contact L, the parts being so arranged that further movement of the arm G′ will break the connection with its contact I, while the weight K will hold it firmly against the contact L. The circuit will now be maintained through the conductor C and connecting wire M from that conductor to the contact L, thence through the arm G′ returning through the conductor D short-circuiting the lamp and allowing the operator to handle the same without any possibility of injury. As soon as the arm A has returned to its horizontal position the weight K′ will rock the two contact arms back to their initial position, as shown in Fig. 3.

I do not limit myself to the specific form herein shown and described.

What I claim as my invention is—

1. The combination with a movable mast arm, a lamp and conductors therefor, of a switch on the mast arm beyond the support thereof and means carried by the arm for actuating the switch by the movement of the arm.

2. The combination with a swinging mast arm, lamp and conductors therefor, of a switch and means mounted upon and independent of the mast arm for actuating the switch upon the movement of the arm, substantially as described.

3. The combination with the movable arm, the conductors, a switch in said conductors comprising switch arms connected together, a weighted lever acting to normally hold said arms in the lamp circuit, adapted upon the movement of the arm to break such connec-

tion and a shunt circuit closed when the lamp circuit is broken, substantially as described.

4. The combination with the movable arm, the conductors, the switch in said conductors adapted to open the lamp circuit and close a shunt circuit, and a weighted lever acting pendulously to actuate said switch upon the movement of the arm, substantially as described.

5. The combination with a swinging support, a lamp on the same, and conductors for the lamp, of a switch carried by the support and a weight for actuating the switch upon the movement of the support, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM A. TURBAYNE.

Witnesses:
JAMES WHITTEMORE,
M. B. O'DOGHERTY.

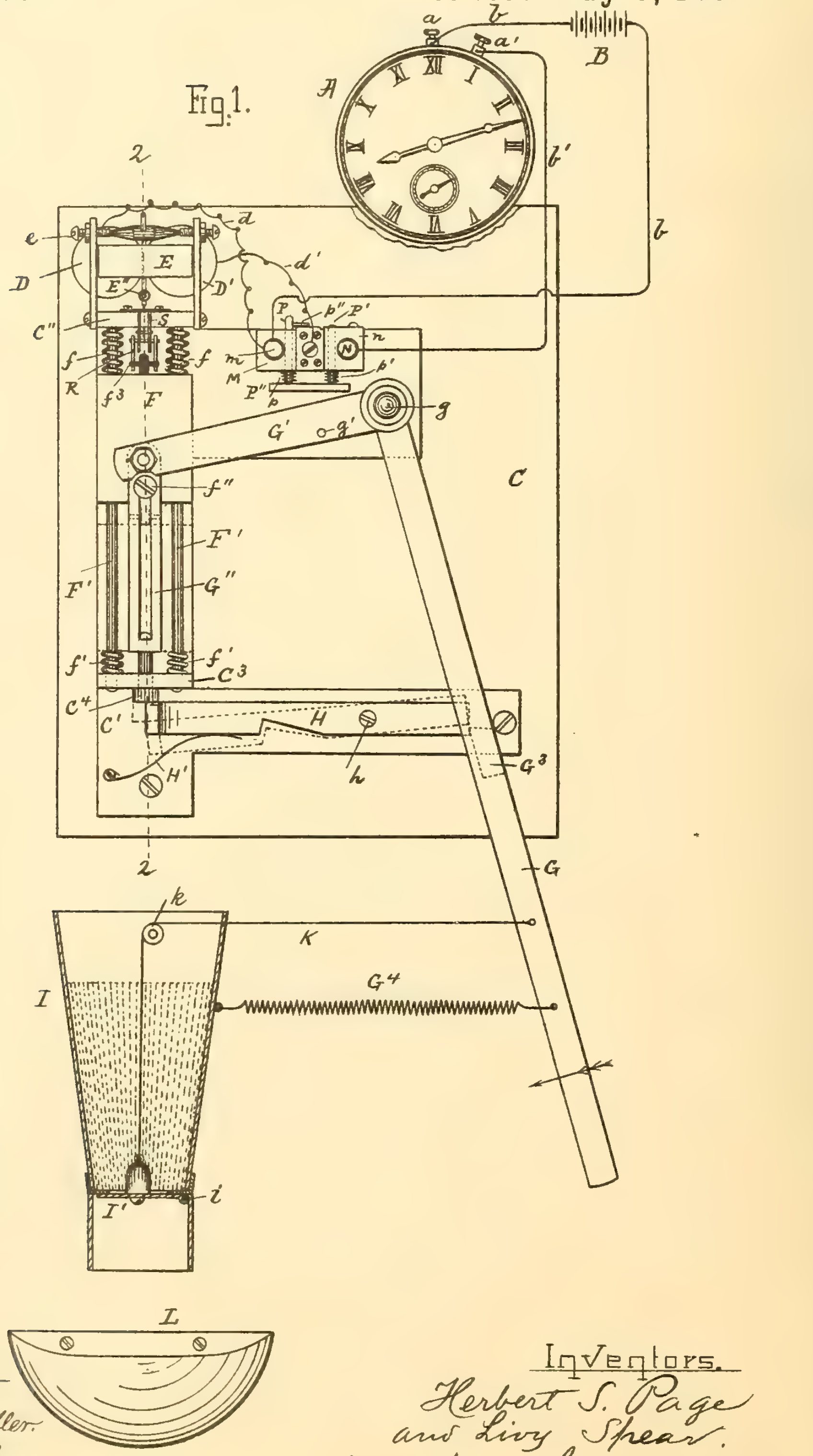
(No Model.) 2 Sheets—Sheet 1.

H. S. PAGE & L. SPEAR.

ELECTRIC TIME STOCK FEEDER.

No. 497,203. Patented May 9, 1893.

Fig. 1.



Witnesses.

Lauritz N. Moller.

Alice A. Perkins.

Inventors.

Herbert S. Page and Livy Spear.

by Alban Andrén their atty.

(No Model.)

2 Sheets—Sheet 2.

H. S. PAGE & L. SPEAR.

ELECTRIC TIME STOCK FEEDER.

No. 497,203.

Patented May 9, 1893.

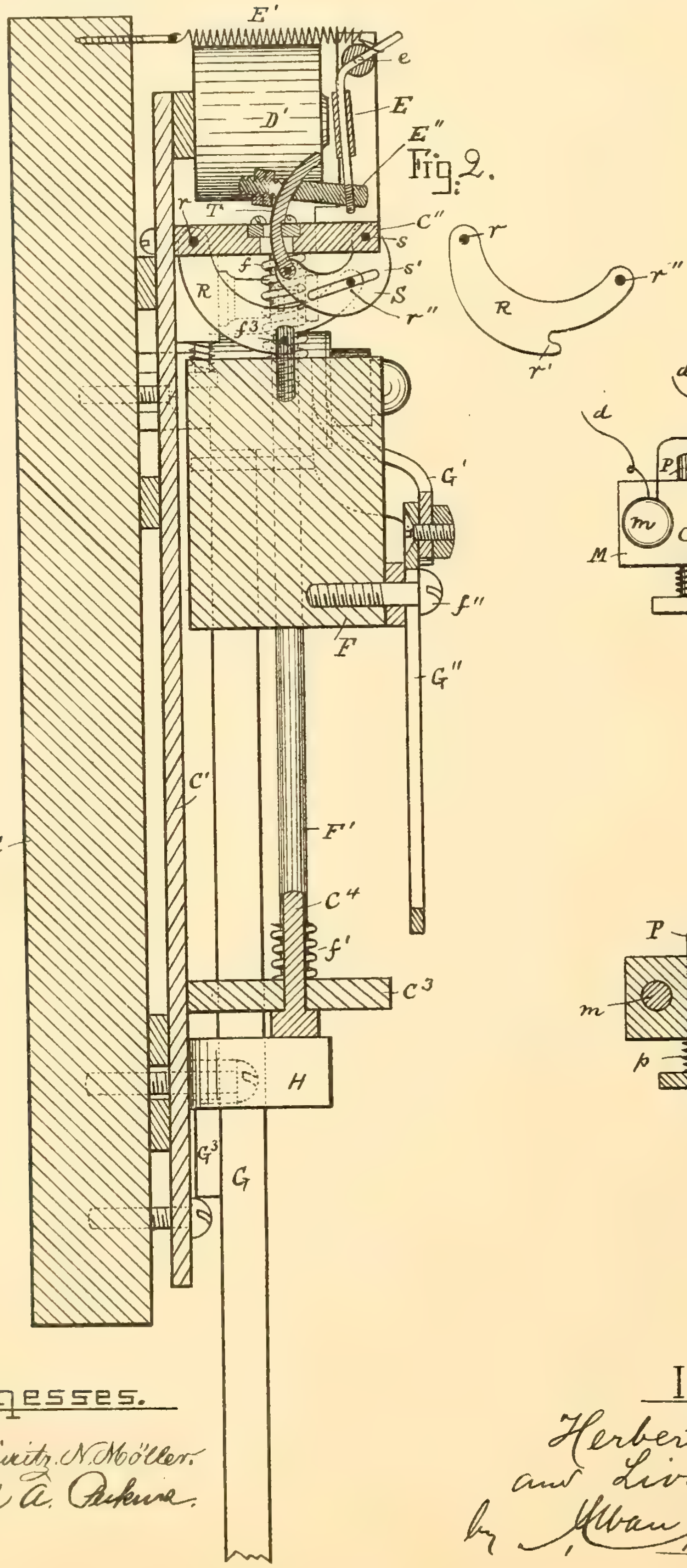


Fig. 2.

Fig. 3.

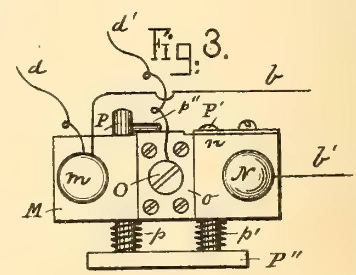
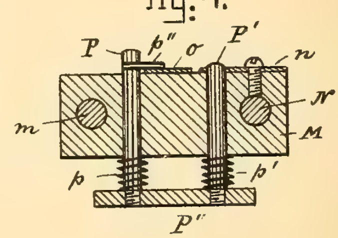


Fig. 4.



Witnesses.

Lauritz N. Möller.

Alice A. Perkins.

Inventors.

Herbert S. Page

and Livy Spear.

by Alban Andrén their atty

UNITED STATES PATENT OFFICE.

HERBERT S. PAGE, OF MEDFORD, AND LIVY SPEAR, OF BOSTON, ASSIGNORS TO EDMUND D. SPEAR, OF BOSTON, MASSACHUSETTS.

ELECTRIC TIME STOCK-FEEDER.

SPECIFICATION forming part of Letters Patent No. 497,203, dated May 9, 1893.

Application filed October 12, 1892. Serial No. 448,690. (No model.)

To all whom it may concern:

Be it known that we, HERBERT S. PAGE, a resident of Medford, in the county of Middlesex, and LIVY SPEAR, a resident of Boston, in the county of Suffolk, State of Massachusetts, citizens of the United States, have jointly invented new and useful Improvements in Electric Automatic Releasing Devices, of which the following, taken in connection with the accompanying drawings, is a specification.

This invention relates to improvements in electric automatic releasing devices and it is particularly well adapted for automatically feeding horses or other animals, at desired times, controlled by clock work or otherwise as may be desired, and it is carried out as follows, reference being had to the accompanying drawings, wherein—

Figure 1 represents a front elevation of the invention showing its connection to an animal feeding device. Fig. 2 represents an enlarged longitudinal section on the line 2—2 shown in Fig. 1. Fig. 3 a represents a front view of the switch or circuit breaker; and Fig. 4 represents a vertical section of the latter.

Similar letters refer to similar parts wherever they occur on the different parts of the drawings.

A represents a clock or time mechanism provided with any suitable circuit closing device connected in any well known manner to the respective binder posts a and a' from which lead wires b and b' as shown in Fig. 1.

B is the battery in the circuit on the wire b as shown.

C is the base of the automatic releasing device and in practice we prefer to attach to it, a metal plate or frame C′, but this is not essential, as the latter may be dispensed with if so desired. On the upper part of the frame C′ are arranged electro magnets D and D′ from which lead the respective wires d and d', to the circuit breaker hereinafter to be described.

E is the armature which is pivoted at e and normally held away from the electro-magnets by the influence of a suitable spring E′ as is common in electrical devices.

From a lever R, hereinafter explained is normally suspended a weight F which is guided on rods F′, F′, provided in their upper and lower ends preferably with suitable springs or yielding cushions f, f, and f', f', for the purpose of relieving the shock or momentum of said weight as it is being moved from its highest to its lowest positions on the rods F′, F′, during the act of releasing and setting it as will hereinafter be more fully described.

G is the releasing lever which is pivoted in its upper end at g and provided with a bell crank or arm G′ to the end of which is pivoted a slotted link G″ that receives a pin or screw f'' attached to the weight F as shown in Figs. 1 and 2.

In Figs. 1 and 2 the upper and lower ends of the guide rods F′, F′, are shown as attached to brackets C″, C^3 on the frame C′.

The lever G is normally held in the position shown in Fig. 1 by means of a spring pressed lever H which is pivoted at h and has one of its ends butting against a projection G^3 on the lever G (shown in dotted lines in Fig. 1), its other end supporting a pin C^4 loosely guided in a perforation in the bracket C^3 as shown in Figs. 1 and 2.

H′ represents the spring by means of which the lever H is held in the normal position shown in Figs. 1 and 2.

The improved electric automatic releasing device may be used for any desired purpose to which it is applicable. In Fig. 1, we have shown it as arranged for automatically discharging or feeding grain for horses or other animals, and in said Fig. 1, I represents a hopper or grain receptacle having pivoted to it at i, near its lower end, a weighted valve or gate I′ which is connected by a chain or cord K going over a pulley k to the lever G as shown in Fig. 1. If so desired a spring G^4 may be connected to the hopper I and lever G for the purpose of swinging the latter in the direction of arrow shown in Fig. 1, when said lever is released. The descent of the weight F as it strikes the pin C^4 causes the lever H to be tripped sufficiently to disengage the lever projections G^3 from said lever H by which the weighted valve I′ is also liberated and as it swings open to discharge the contents of the hopper I it causes the lever G to

move in the direction of the arrow shown in Fig. 1, which movement of lever G throws the arm G′ upward and by this means the weight F is automatically raised and engaged with the lever R.

L in Fig. 1, represents a feed trough below the hopper or chute I as usual.

The improved circuit breaker which is arranged in the circuit between the electro-magnets, battery and circuit-closing time mechanism is represented in Figs. 1, 3 and 4 and is constructed as follows: It consists of a plate M, made of a suitable insulating material secured to the frame C or other stationary part of the apparatus. Said plate M has a binding post m to which the wires b and d are metallically connected. If so desired the binding post m may be dispensed with and the wire b connected directly to the wire d without departing from the essence of our invention.

N is another binding post secured to the plate M, which binder post is connected to the wire b' leading to one of the binding posts on the clock-mechanism A as shown in Fig. 1. The binding post N is metallically connected to a metal plate n arranged on the plate M as shown.

O is another binder post on the plate M which is metallically connected to a metal plate o, and is also connected to the wire d' leading to the electro magnets as shown in Figs. 1 and 3.

P and P′ are metal rods adapted to move in perforations in the plate M, said rods being connected in one end by means of a metal plate P″ between which and the plate M are located springs p, p' by means of which the parts P, P′ and P″ are normally held in the position shown in Figs. 1, 3 and 4, in which position the rod P is held in metallic contact with the plate o and its binder post O by means of a pin or side projection p'' on said rod P, and the springs p, p'. The rod P′ passes through a perforation in the plate n and is continually in metallic contact with the latter and its binder post N.

The lever G′ is provided with a pin or projection g' (shown in Fig. 1) which comes in contact with the spring pressed plate P″ as the lever G is moved in the direction of the arrow shown in Fig. 1 by which the circuit is broken between the binder posts N and O on account of the pin p'' being pushed away from the plate o to which the binder post O is attached, thus leaving the circuit broken as long as the valve I′ remains open after the discharge of the grain, &c. by which the battery is prevented from being unnecessarily used up, and shutting off the circuit from the electro magnets by which the armature E is withdrawn by the influence of the spring E′ to enable the weight F to be suspended from the armature connections hereinafter to be described. As soon as the lever G is returned to the position shown in Fig. 1, a metallic connection is automatically established between the posts N and O by the springs p, p' forcing the pin p'' against the plate o to which the binder post O is connected. The link or lever R, is provided with a notch or recess r' for receiving a pin f^3 on the weight F, whereby the latter is supported in its elevated position by the link or lever. This link or lever is pivoted at r to the inner end of a bracket C.″

S is another link or lever pivoted at s to the bracket C″ and provided with a slot s' adapted to receive a pin or projection r'' on the lever R as shown. To the upper end of the link S is pivoted the locking rod T having a notch or recess adapted to be locked on the bracket C″ or a plate secured thereon as shown in Fig. 2. The upper end of the locking rod T is loosely connected to a rod E″ forming a part of or connected to the armature E as shown in Fig. 2. The attraction of the armature toward the electro magnet causes the link T to be released allowing the links R, S to spread apart, one moving inward and the other outward, whereby the weight F is liberated and allowed to drop onto the pin C^4 by which the lever H is tripped, and the lever G is liberated from the latter and caused to swing in the direction shown by the gravity of the released weighted valve I′, which allows the grain to drop out from the chute or hopper I at or about the same time as the weight F is caused to move upward to its normal locked position by the movement of the said lever G in the direction shown by the arrow in Fig. 1, thus automatically returning and locking the weight F in position for a subsequent operation. Preparatory to placing a new charge of grain, &c., in the hopper, the handle lever G is swung back to its normal position shown in Fig. 1 causing it to be locked in such position by the spring actuated lever H at the same time as the valve I′ is returned to its closed position. At the appointed time when the clock A closes the circuit the armature E will be attracted to the electro magnet causing the suspended weight F to be liberated for the purpose of opening the valve or gate I′ and so on from time to time as may be required. The invention although particularly designed for automatically feeding horses or other animals may to equal advantage be used as an automatic releasing device for any other purpose to which it may be applicable without departing from the essence of our invention.

What we wish to secure by Letters Patent and claim is—

1. The combination with a time mechanism, an electro magnet, and an armature, of a vertically movable weight, a lever mechanism normally supporting the weight and released by the attraction of the armature to free the weight, an electric circuit including the time mechanism and magnet, a battery and circuit breaker in the circuit, a lever loosely connected with the weight, a trip normally en-

gaging the lever and released therefrom by the descent of the weight, and means for swinging the lever to operate the circuit breaker and raise the weight when said trip is operated, substantially as described.

2. In an electric automatic releasing device, an electro magnet and armature combined with a locking link T connected to said armature, a pair of links R, S, pivoted together and to the link T and means substantially as described for suspending and releasing the weight F as and for the purpose set forth.

3. In an automatic electric releasing device, the combination with a time mechanism, of the herein described circuit breaker, consisting of an insulator M having binder posts N, O, and a spring pressed plate P″ having rods P, P′, one of the latter having a projection adapted to break the circuit by the movement of the said rods in the insulator M, substantially as and for the purpose set forth.

4. The combination of a circuit closing clock, a battery, an electro magnet, an armature, a circuit breaker in the circuit, a lever mechanism held in operative position by the armature, a weight supported by the lever mechanism and released by the closing of the circuit, a lever connected to a discharge device I and arranged to break the circuit when released, and a trip arranged to hold the lever and operated by the descent of the weight, substantially as described.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, on this 24th day of September, A. D. 1892.

HERBERT S. PAGE.
LIVY SPEAR.

Witnesses to Herbert S. Page:
ALBAN ANDRÉN,
ALICE A. PERKINS.

Witnesses to Livy Spear:
CHAS. F. PARKER,
K. E. PARKER.

(No Model.)

2 Sheets—Sheet 1.

W. B. MARTINDALE.

AUTOMATIC TIME STAMP.

No. 497,331.

Patented May 16, 1893.

Fig. 1.

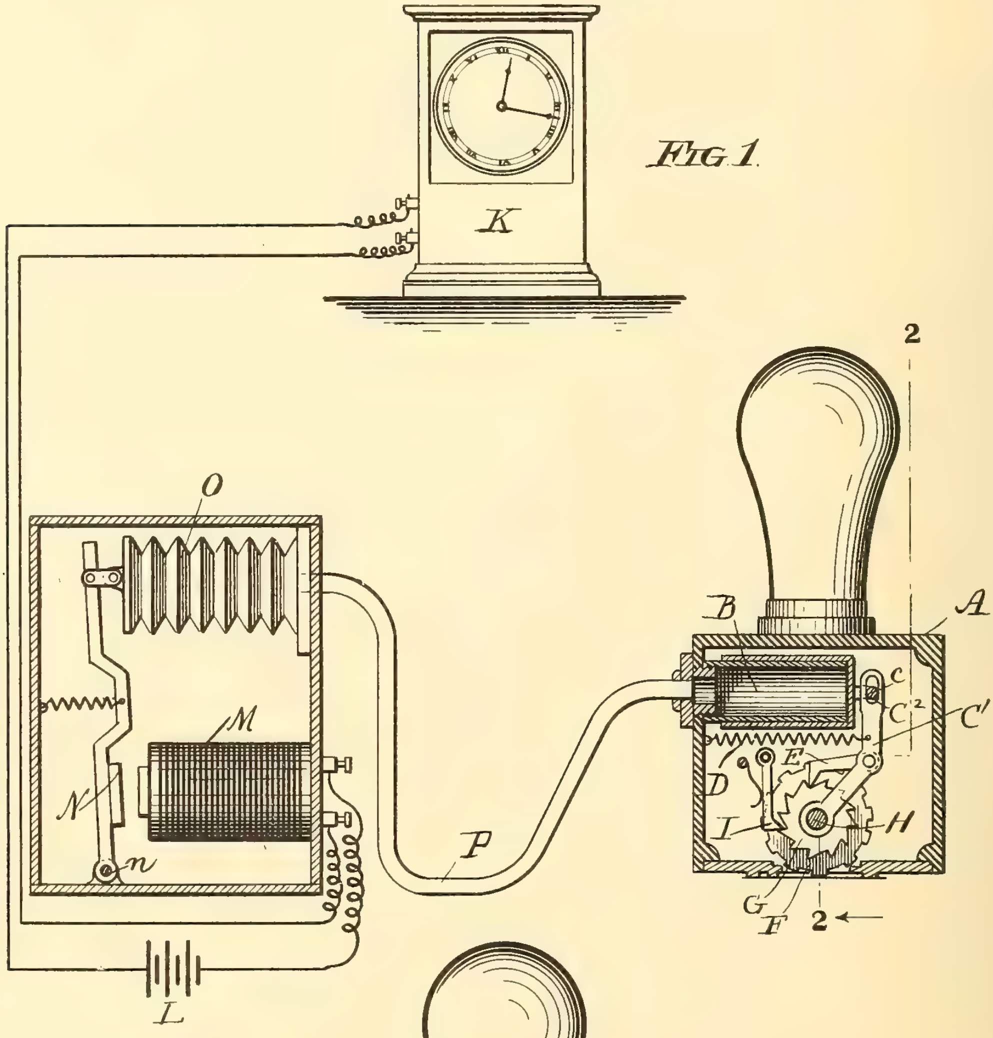
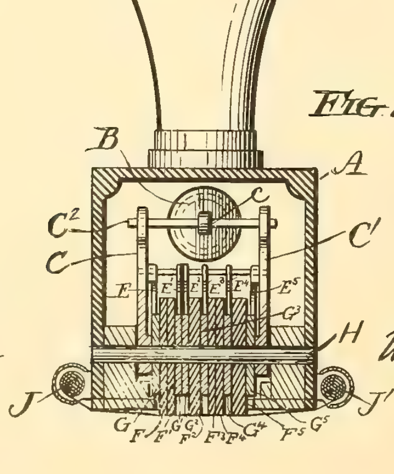


Fig. 2.



Witnesses:

J B Halpenny

H. E. Koch

Inventor:

Warren B. Martindale

THE NORRIS PETERS CO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. B. MARTINDALE.

AUTOMATIC TIME STAMP.

No. 497,331. Patented May 16, 1893.

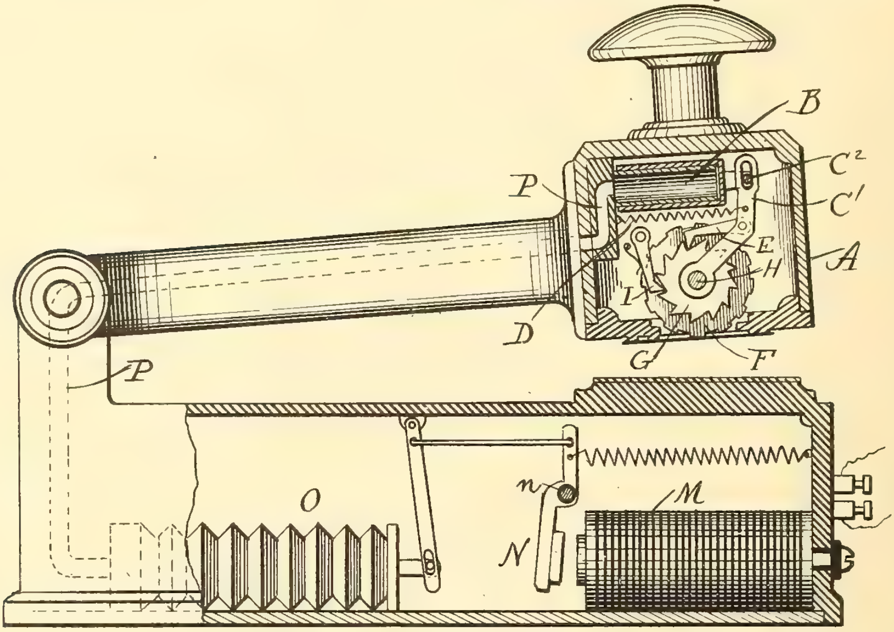


FIG 3.

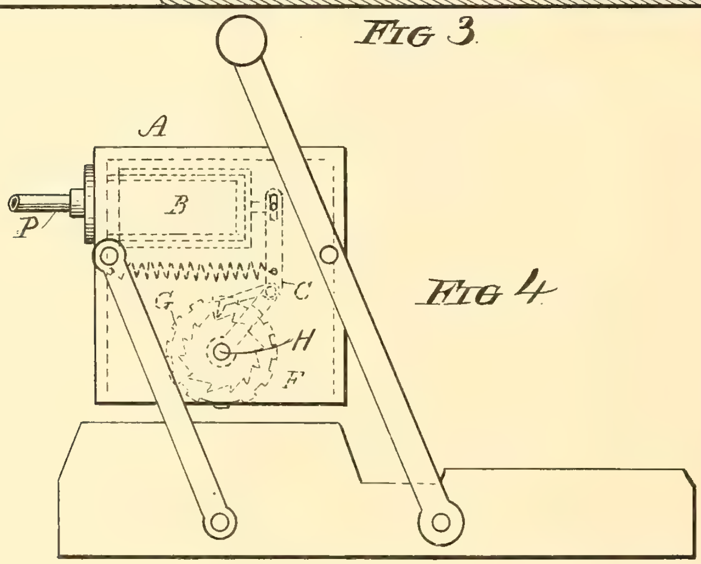


FIG 4.

Witnesses:

J. B. Halpenny

H. E. Koch

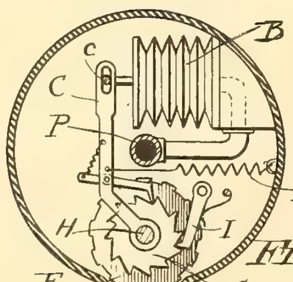


FIG. 5.

Inventor:

Warren B. Martindale

UNITED STATES PATENT OFFICE.

WARREN B. MARTINDALE, OF ROCHESTER, INDIANA.

AUTOMATIC TIME-STAMP.

SPECIFICATION forming part of Letters Patent No. 497,331, dated May 16, 1893.

Application filed June 30, 1892. Serial No. 438,643. (No model.)

To all whom it may concern:

Be it known that I, WARREN B. MARTINDALE, of the town of Rochester, in the county of Fulton, in the State of Indiana, have invented certain new and useful Improvements in Automatic Time-Stamps; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings and the letters of reference marked thereon, making part of this specification.

This invention relates to automatic time dating stamps, of the class adapted to make the impression on the upper side of the paper and has for its object to provide a simple and less cumbersome device for automatically changing the time mechanism in synchronism with a regulating time piece.

It consists in the combination of a pressure chamber, preferably in the form of a bellows, with the time printing mechanism, and means for operating the same periodically in synchronism with a time regulator, by causing air or liquid to be forced through a tube to the said pressure chamber at regular intervals, governed by the time regulator thereby causing the automatic movement of said time printing mechanism in synchronism with the said time regulator, substantially as described and claimed.

In the accompanying drawings, Figure 1, is a sectional side elevation of a hand stamp embodying my invention. Fig. 2, is a vertical section in line 2, 2 of Fig. 1. Fig. 3, is a longitudinal section showing my invention as applied to a time stamp, having a swinging arm. Fig. 4, is a sectional side elevation showing my invention as applied to a time stamp adapted to make the impression by a lever movement. Fig. 5, is a vertical section, in a plane transversely to the axis of the type wheels, of a time stamp embodying my invention, in which the printing mechanism is carried in a revolving head or cylinder adapted to make impressions therefrom by the revolution of said cylinder.

Similar letters indicate like parts in all the figures.

A, represents the casing or movable head carrying the mechanism of the time stamp, of which mechanism B is the pressure chamber fitted in the casing A, preferably in a horizontal position transversely to the axis of the type wheels.

C, C′, are parallel levers connected at the upper ends with a cross bar C^2, which is attached at *c* by a pivotal joint to the movable end of the pressure chamber B, the levers C, C′, being pivoted at their lower ends, preferably on the axial shaft H of the time indicator wheels and therefore free to be swung back by the movement of the pressure chamber B and retracted by the spring D.

The indicator mechanism for the time stamp is mounted within the casing directly under the pressure chamber B in close proximity thereto. Said indicator mechanism as shown consists, as is usual in this class of stamps, of a series of wheels F, F′, F^2, F^3, F^4, F^5, with the type on the peripheries thereof to indicate the date and time of day when brought into line of print at the bottom, each of said wheels carrying a ratchet G, G′, G^2, G^3, G^4, and G^5 adapted to be engaged and actuated by means of the reciprocating pawls E, E′, E^2, E^3, E^4 and E^5, carried by the levers C, C′, and regulated by stop pawls as at I.

The details of construction, arrangement and operation of the time printing mechanism form no part of my present invention, and I do not confine myself to the use of type wheels, but type bands or any other time indicating mechanism of approved description may be used.

The indicating mechanism shown in the drawings is in its general construction and mode of operation substantially the same as described in Letters Patent of the United States granted to Joseph D. Mallonee, on August 12, 1890, No. 434,396.

J, J′, are spools carrying an ink ribbon through which impressions are made, but any other suitable inking device may be employed.

My invention consisting in a method of causing the automatic movement of the mechanism of the time stamp, in synchronism with a time regulator by the pressure of fluid through a tube at regular intervals. I have shown in Fig. 1, means for producing such pressure. Thus, K is a clock containing a circuit closer of any approved design, shown in circuit with an electric battery, L; M an electro-magnet, N an armature for said magnet pivoted at *n*, and having a spring to retract the same, the

upper end of its lever being attached to the compressing device O which is connected by the tube P with the pressure chamber B in the time stamp.

The operation is as follows: The clock closing the electric circuit at regular intervals causes the magnet to attract its armature, the movement of which brings a pressure upon the compressing device, O, forcing the air or liquid through the tube P to the pressure chamber B, causing the same to expand and carry back the pawl levers C, C', which as soon as the pressure is removed from said compressing device by the release of the armature, is again retracted by the spring D thereby causing the movement of the time mechanism one step.

I do not confine myself to this method of producing impulses of air or liquid which may also be produced at regular intervals by any of the usual and well known methods, as by a pneumatic clock of any approved pattern.

It is obvious that the pressure chamber described, being lighter than an electro-magnet, will render a hand stamp much more convenient to handle than one in which the magnet is embodied in the stamp, and being connected with the time regulator by a flexible rubber tube may be carried freely in the hand and the impression made wherever desired.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a time stamp, the combination, with the time printing mechanism, of a pressure chamber, adapted to be actuated by fluid impulses, and means for transmitting the movements thereof to said time printing mechanism.

2. In a time stamp, the combination, with the time printing mechanism, of a pressure chamber, adapted to be actuated by fluid impulses, means for transmitting motion from said pressure chamber to the time printing mechanism, a time regulator, and time transmitter, consisting of a tube through which fluid is forced at intervals governed by the time regulator, substantially as described.

3. In a time stamp, the combination, with the time printing mechanism, of a pressure chamber adapted to be actuated by fluid impulses, means for transmitting motion from said pressure chamber to the time printing mechanism, and a prime motor, consisting of an electric battery, time mechanism in circuit with said battery, an electro-magnet, also in said circuit, an armature for said magnet, a compressing device, suitably connected with said armature, and a tube connecting said compressing device with the pressure chamber, substantially as described.

In testimony whereof I have signed my name to this specification in presence of two subscribing witnesses.

WARREN B. MARTINDALE.

Witnesses:
JUDD B. LIGHT,
ROME C. STEPHENSON.

(No Model.)

A. GLEASON.
TIME CHART.

No. 497,917. Patented May 23, 1893.

Fig. 1

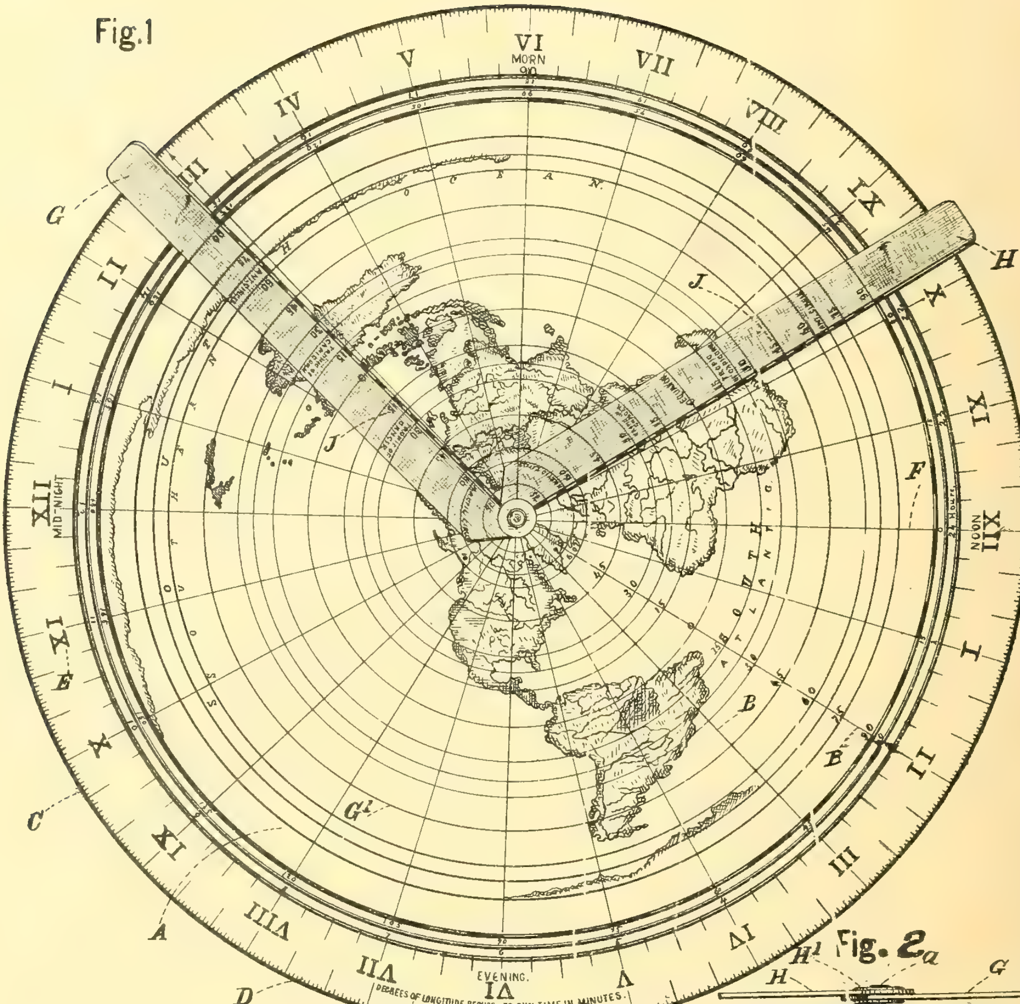


Fig. 2a

Witnesses.
Jennie M. Caldwell.
Henry C. Ashbery

Alexander Gleason, Inventor.
By James Sangster
Attorney.

UNITED STATES PATENT OFFICE.

ALEXANDER GLEASON, OF BUFFALO, NEW YORK, ASSIGNOR TO THE BUFFALO ELECTROTYPE AND ENGRAVING COMPANY, OF SAME PLACE.

TIME-CHART.

SPECIFICATION forming part of Letters Patent No. 497,917, dated May 23, 1893.

Application filed August 15, 1892. Serial No. 443,074. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER GLEASON, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and Improved Time-Chart, of which the following is a specification.

My invention has reference to certain mechanical devices and geographical illustrations, to be used on a flat circular map of the world, and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 represents flat circular map of the world, showing the outlines of the several continents, some of the larger islands, the indicating arms and other matter which will be more clearly hereinafter shown. Fig. 2 is a vertical central sectional elevation through a small central portion of the map, showing a portion of the indicating arms and the construction of the parts by which they are secured movably together and the two to the map.

Referring to said drawings—A represents the map proper which is circular in form, and flat; having twenty four radiating or meridian lines, B, extending from the center to the circumference. The periphery, C, of the circle being divided into divisions, D, which represent the minutes in twenty four hours; (for this purpose it would take fourteen hundred and forty of these divisions.) I have shown but half of this number in the drawings because the whole number would bring the lines too near together for showing them clearly. The twenty four meridian lines are divided near the periphery into quarters each representing quarters of an hour and at the periphery into sixty divisions each representing minutes of meridian time. A little way in from the periphery and at the twenty four hour divisions, are shown the hours of the day in Roman numerals, indicated by the letter, E, and commencing the reckoning of time from Greenwich, London, or on the line F.

On the face of the map proper, and within another circle (still toward the center) is laid out the continents, principal islands, rivers and cities of the world; their latitudes, and longitudes corresponding to the latitudes and longitudes of all other first class geographical globe maps or charts of the world.

On the face of the map are circular lines from the center or north pole to ninety degrees south representing the latitudes of the earth, both north and south of the equator. These circular lines are indicated by the letter, G′.

In operating with this map I employ two indicating arms G and H, pivoted together by means of a pin, *a*, having a flange, *b*, (see Fig. 3), the two arms G and H being put on said pin above the flange, *b*, then a light spring washer H′, in the top of the arm H and the head of the pin riveted so that the two arms are held together by friction and can be turned on each other back and forth.

In the center of the map is an eyelet, *c*, and into the opening (through the eyelet, *c*), is put the lower end, *d*, of the pin, *a*, so that these indicating arms have two movements, a movement one on the other and one or both together around the center of the map, and may be detached at pleasure from the map if so desired, and are also made easily removable by simply lifting the pin, *d*, out of the eyelet *c*. On these indicating arms are numerals, J, indicating degrees of latitude corresponding to the degrees of latitude as represented and marked on the map at B at thirty degrees west of Greenwich. By bringing either of the indicator arms to any given point, the latitude and longitude of the said point may at once be determined without future computation.

In order to ascertain the time of day or night, in any part of the world, corresponding to your own meridian time; first: place the lower indicating arm, G, into the center socket or receptacle, letting the graduate edge of the arm be in line on your own meridian time, for instance if it be New York, which is the fifteenth meridian: Now you wish London's corresponding time:—Place the arm H, on the meridian of Greenwich, which is London, and marked, F, at the same time holding the arm G in its place. You have now got the absolute corresponding difference of time between New York and London, which is five hours in round numbers. Next look at your own pocket time or clock, and if it be just

eleven o'clock; move the arm G to eleven and the arm H, will still retain its relative position to arm G, (as the two arms are held to each other by friction) and indicate six p. m. or the corresponding fractional parts of an hour be it more or less. Thus the time stands all ready computed to any child who is able to read the time of day from the face of an ordinary clock. Again, in order to give the child the most simple lesson first I would get the difference of the time between the two places as above mentioned, then placing the arm G at twelve, of course the arm H will stand at five p. m. for London, and there is no computation or counting for the child to make; he thus reads the hour and fractional part thereof from the dial of the map. The utility of such a computating map will be obvious, not only to the school child but for an adult or official person. The map is not so extorted as to lose the relative latitude and longitude of any places on the land or sea, but retains all latitudes and longitudes of places agreeing with other recognized authors; and as the proper relations of continents and countries all stand in their relative position to each other, they are thus impressed upon the mind of the student. The extorsion of the map from that of a globe consists, mainly in the straightening out of the meridian lines allowing each to retain their original value from Greenwich, the equator to the two poles.

I claim as my invention—

The combination with a time chart of a circular time dial encompassing the circular map, a disk or dial graduated and divided to indicate longitude and sun time on any meridian line or intervening lines, two indicating arms loosely pivoted to the center of the circular map, numerals indicating degrees of longitude on each of said arms, and a pivoted joint for holding said arms together so the friction between them will be sufficient to hold them one to the other at any point to which one may be moved on the other and permit both to be moved together by turning one, substantially as and for the purposes described.

ALEXANDER GLEASON.

Witnesses:

JAMES SANGSTER,
JENNIE M. CALDWELL.

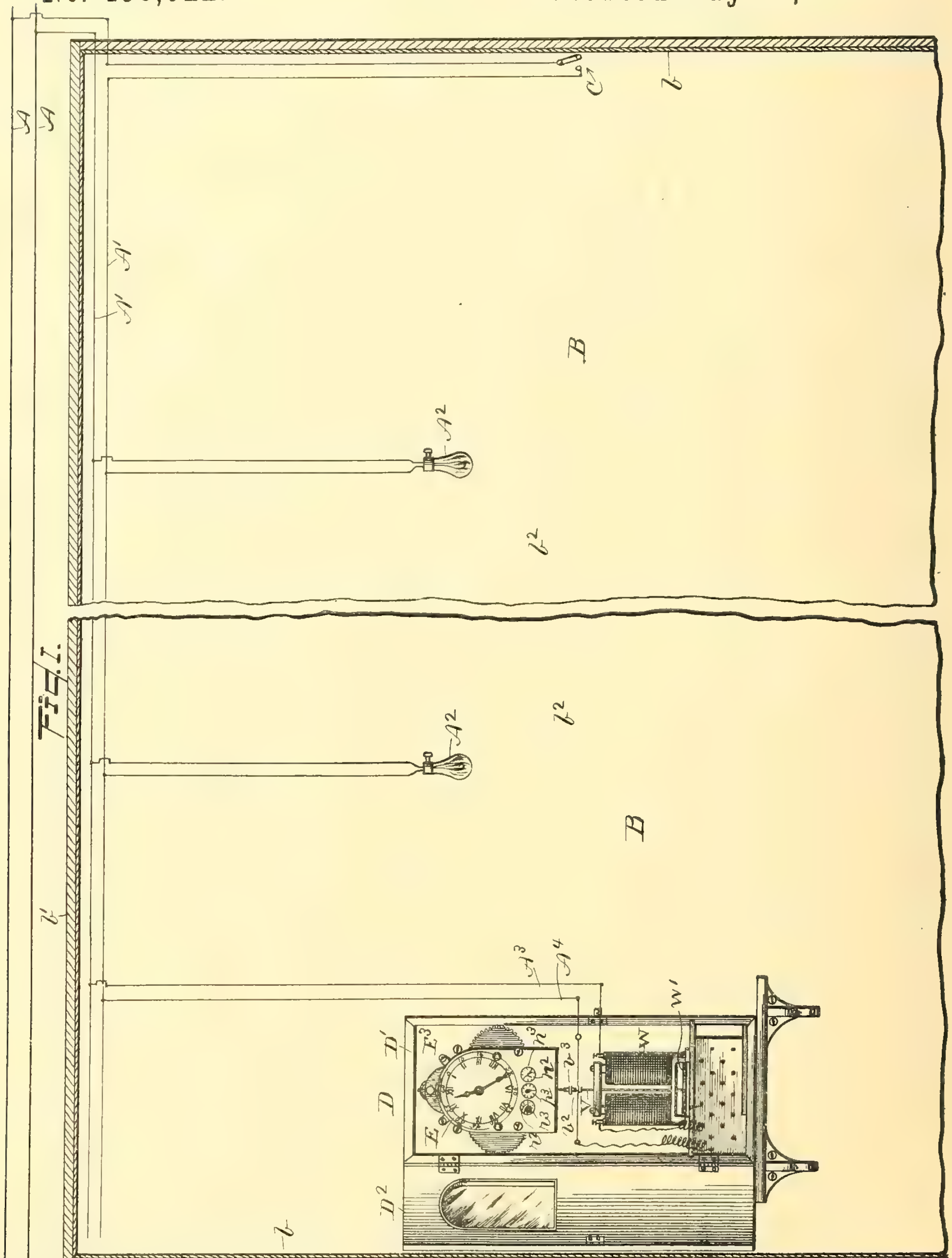
(No Model.)

3 Sheets—Sheet 1.

H. H. PATTEE.

ELECTRIC CURRENT TIME METER.

No. 498,022. Patented May 23, 1893.



Witnesses:
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H. M. Richards.

Inventor:
H. H. Pattee,
By W. B. Richards,
Atty.

(No Model.) 3 Sheets—Sheet 2.

H. H. PATTEE.

ELECTRIC CURRENT TIME METER.

No. 498,022. Patented May 23, 1893.

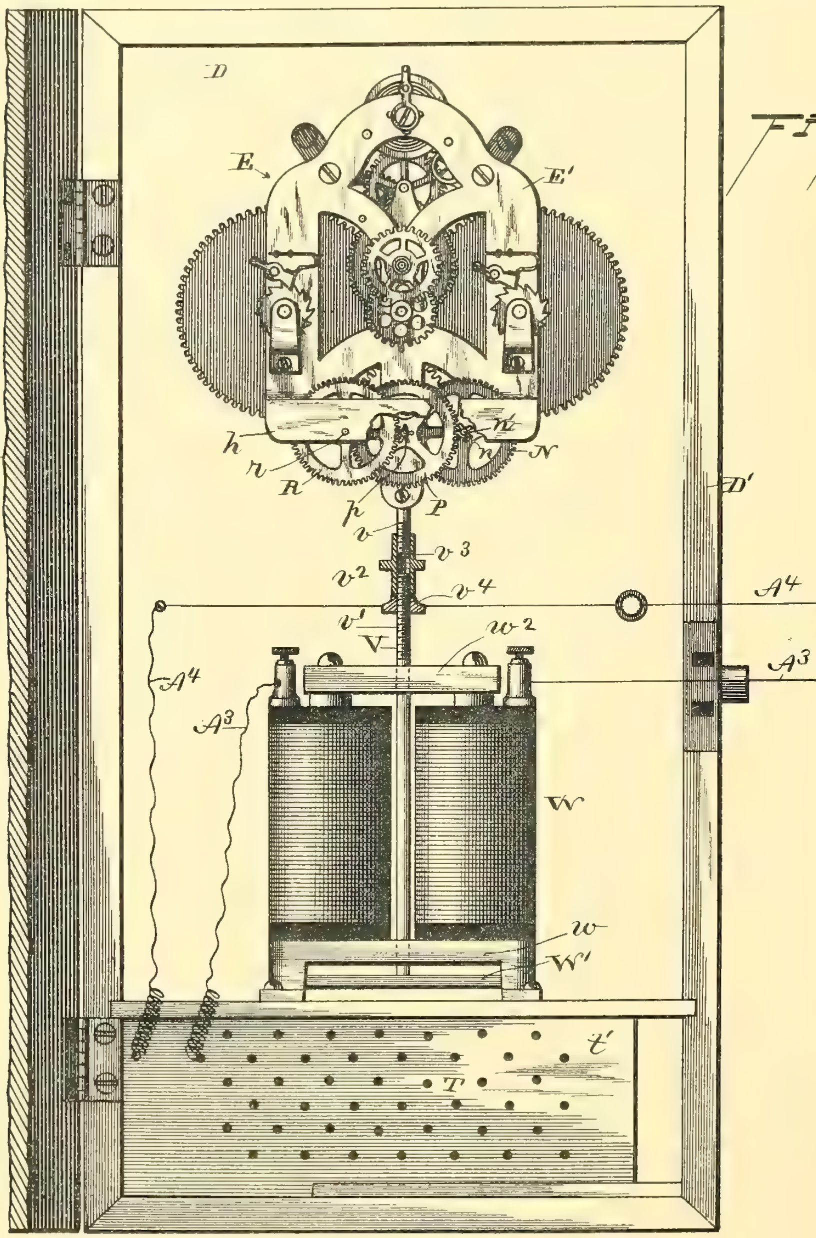
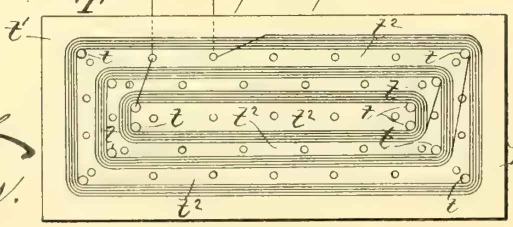


Fig. 2.

Fig. 6.



Witnesses:
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(No Model.) 3 Sheets—Sheet 3.

H. H. PATTEE.

ELECTRIC CURRENT TIME METER.

No. 498,022. Patented May 23, 1893.

Fig. 3.

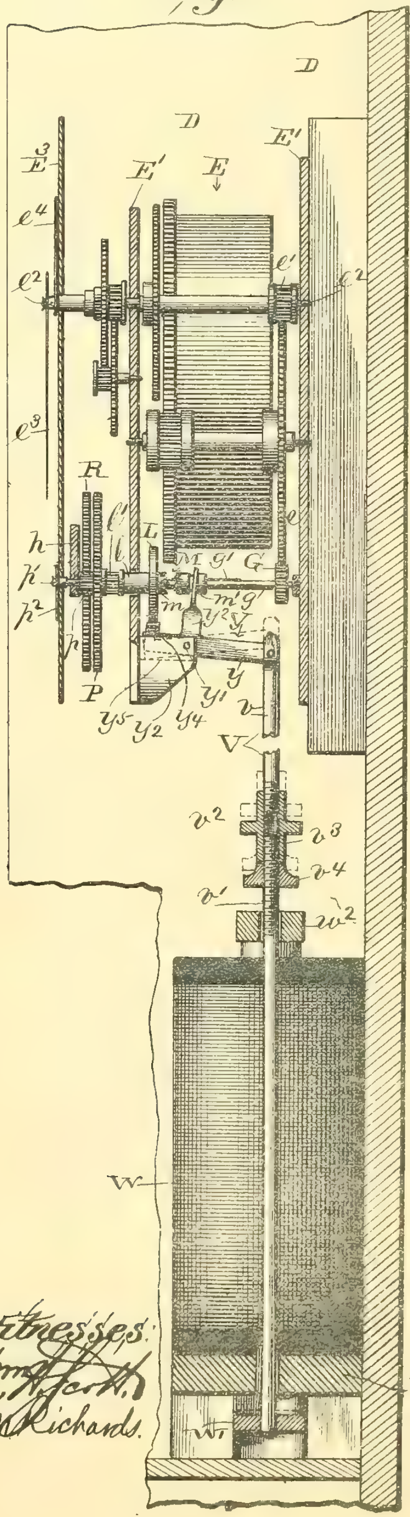


Fig. 4.

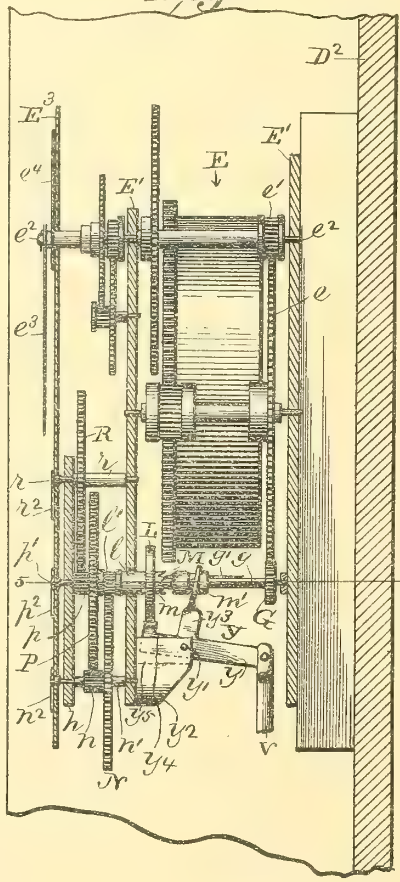
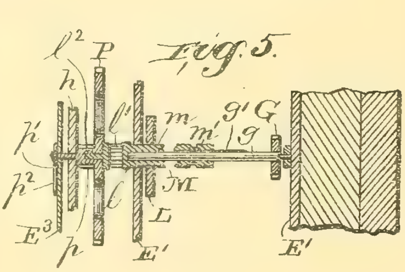


Fig. 5.



Witnesses:

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UNITED STATES PATENT OFFICE.

HENRY H. PATTEE, OF MONMOUTH, ILLINOIS.

ELECTRIC-CURRENT TIME-METER.

SPECIFICATION forming part of Letters Patent No. 498,022, dated May 23, 1893.

Application filed September 6, 1890. Serial No. 364,200. (No model.)

To all whom it may concern:

Be it known that I, HENRY H. PATTEE, a citizen of the United States, residing at Monmouth, in the county of Warren and State of Illinois, have invented certain new and useful Improvements in Electric-Current Time-Meters, of which the following is a specification.

This invention relates to electric meters, of that class which automatically measure and register or record the duration of the passage of electric currents through wires or conductors, or in other words, which measure and record or register the time during which an electric current or a successional series thereof are passing through a wire or conductor; and the invention relates more especially to that type of such electric meters in which a divided portion of the electric current, such as is used to operate an electric motor or motors, an electric lamp or lamps, or for other purposes, is also made, when the electric current is established, to throw a time registering mechanism into gear with a continuously running clock movement, whereby the time registering mechanism will be operated by and with the clock movement while the electric current is established, and will be thrown out of gear with the clock movement and its operations cease when the electric current is broken.

While my invention may be used to measure and record the time during which an electric current or successional series of electric currents are passing over or through an electric current conductor when such conductor and the electric current which it carries are adapted and applied to supply propulsive energy to operate an electric motor or motors, an electric lamp or lamps, or for other uses and purposes, I have shown it and described it herein as adapted and used for the purpose of furnishing means for measuring and recording the time during which a single lamp or separate groups of incandescent electric lamps have, each lamp or group of lamps, been lighted or energized by the divisional portion of a main electric current, which operates said lamp or group of lamps, whereby readings may be made at given periods, say of one month, week, or other desired period, showing the sum of the times that such electric lamp or lamps have been used during said period, in any particular building, room or other place lighted by a lamp or lamps connected with one branch of an electric circuit.

The novel means employed in carrying out the foregoing recited objects and purposes of my invention, as adapted for measuring and recording the duration of electric currents over branches of electric conductors, are hereinafter described, and the combinations and constructions thereof in which the invention consists are made the subject matter of the claims hereto appended.

The preferred construction of parts and arrangements thereof are illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of part of the main circuit wires or conductors, in an ordinary system of electric lighting apparatus, of branch wires leading therefrom and provided with electric lamps, and of my electric meter, and a sectional elevation of a room or building in which the lamps are located, and to one wall of which the meter is fixed; Fig. 2, an enlarged elevation, partly broken away, of my electric meter, shown with the door of its containing case partly broken away and open, and also shown with the clock movement face plate and the time registering dials and pointers removed; Fig. 3, an enlarged central sectional elevation of the electro-magnet, clock movement, time registering mechanism, and part of the containing case. Fig. 4 is an elevation, partly in section, showing parts of the clock movement and time registering mechanism in gear, as in Figs. 1, 2, and 3, but some of the parts in changed positions from that shown at said figures, in order to show more clearly in one figure the co-operation of certain parts, which could not be otherwise shown. This figure shows the system of gear wheels and other parts of the time registering mechanism arranged in a vertical plane, instead of a horizontal plane, as shown in Figs. 1, 2 and 3. Fig. 5, is a sectional plan, in the line 5, 5, in Fig. 4; Fig. 6, a sectional elevation lengthwise of the resistance coil.

The reference letters used indicate respectively, the same parts in the different figures of the drawings.

The parts of cable or main conductor wires, A, shown in the drawings, may be cables or main conductors of any ordinary kind, ex-

tending from any ordinary dynamo electric machine or machines, (not shown,) or from any suitable generator of electric currents.

At Fig. 1 I have shown wires A′, connected with the main wires or conductors A in an ordinary way, and which extending therefrom constitute an ordinary branch or division of the main circuit. The branch wires A′, as shown, extend into a room B, two of the walls b and the ceiling b' of which are shown in section, and one wall b^2 in elevation. The wires A′ are provided with a switch C, which is opened and closed to open and close the circuit, in an ordinary manner.

In the drawings I have shown two incandescent electric lamps A^2 connected with the wires A′ in an ordinary manner, but it will be understood that any number of lamps may be used that will be practical. The wires A′ are shown as disconnected at their distal ends, to provide for extensions to other rooms or places, or for subdivisions into subordinate branches, as may be desired or required for lighting purposes or for other purposes.

The operative parts of the meter D are assembled and mounted in a suitable case D′, which has an ordinary door D^2. The case D′, as shown at Fig. 1, is fixed to the wall b^2 of the room B, but may be fixed in any suitable location where the wires A′ can be connected with the meter as hereinafter described.

The clock movement E, shown in the drawings, is an ordinary spring movement, but any other suitable time movement or train may be used if preferred. The movement E is mounted in an ordinary frame E′, which frame is preferably fixed in the upper part of the case D′, but may be located in any other part thereof if preferred. The clock movement or train need not be further herein described than to point out that its main wheel e, see Figs. 3 and 4, gears with the pinion e' on the shaft e^2 which carries the minute hand e^3 of the clock, and operates the hour hand e^4 and minute hand in an ordinary manner. The main wheel e also gears with and rotates a pinion G which is fixed upon a shaft g, and this pinion G has same number of cogs as the pinion e', and hence the pinion G and shaft g complete a rotation once an hour simultaneously with the minute hand of the clock, and operate continuously with the clock movement. The pinion G and shaft g constitute the intermediary gear between the clock movement and the electric current time registering mechanism hereinafter described, and which consists in a registering mechanism, and a clutch gear, which clutch gear is operated by establishing and breaking the electric circuit, for the purpose of throwing said registering mechanism into and out of gear with the shaft g, and thereby into and out of gear with the clock movement. The electric current registering mechanism is mounted in the clock frame E′ and a frame bar h which is supported in front thereof.

L is a smooth rim friction wheel, loosely seated on the end of the shaft g, and has fixed to its inner side one member m, of a clutch M, and fixed to its outer side a hub l, on the outer end of which is fixed a pinion l', which gears with and rotates a wheel N, to which is fixed a pinion n. The wheel N is fixed upon a shaft n', and this shaft n' extends outwardly and carries a hand or pointer n^2 which traverses a dial n^3 that is circularly graduated and marked into ten equal divisions, on the clock face E^3, which face is preferably carried in a plane in front of the system of gear of the registering mechanism. The wheel N has ten times as many cogs as the pinion l', and hence will give ten complete rotations to the pointer n^2 to each single rotation of the pinion l', when said pinion l' is placed in gear with, to rotate simultaneously with, the shaft g by sliding the member m' of the clutch M into gear with the member m—the member m' being free to slide lengthwise of the shaft g, but held to rotate therewith by the spline g'. The ten divisions of the dial n^3 will thus indicate each an hour, and all of them ten hours, as the pointer n^2 traverses them.

The pinion n gears with a wheel P, which is journaled on a short journal l^2 that projects axially from the end of the pinion l' (see Fig. 5), and a pinion p is fixed to the outer side of the wheel P, from which a short shaft p' extends outwardly, and carries on its outer end a pointer p^2 which traverses a dial p^3 that is circularly graduated into ten equal divisions. The wheel P having ten times as many cogs or teeth as the pinion n, will be rotated once to each ten rotations of the wheel N, and hence the pointer p^2 at each division of the dial p^3—will indicate a complete rotation of the pointer n^2, and a complete rotation of the pointer p^2 indicate ten rotations of the pointer n^2. The pinion p gears with a wheel R, the shaft r of which extends outwardly and carries on its outer end a pointer r^2 which traverses a dial r^3 that is circularly graduated into ten equal divisions. The wheel R having ten times as many cogs as the pinion p will be rotated once by ten rotations of the wheel P, and hence the pointer r^2 at each division of the dial r^3 will indicate a complete rotation of the pointer p^2, and a complete rotation of the pointer r^2 will indicate ten rotations of the pointer p^2, and one hundred rotations of the pointer n^2.

An ordinary electro magnet W and a resistance coil T are fixed in the case D′, and a conductor or wire A^3 extends from one of the wires A′ to the wire coils of the magnet W, and thence to the wire coils of the resistance coil T, from which a wire A^4 extends to the other wire A′, and thus completes a circuit of the wires A^3, A^4, through the electro magnet and resistance coil.

One main object of the electro magnet and the entire object of the auxiliary resistance coil when used therewith as in my improvement, is to increase the resistance to such an extent as to reduce the ampères of the

electric current that may pass through the wires A^3, A^4, A', to the minimum flow necessary to operate the trip mechanism which is operated by starting and stopping the electric current, to throw the registering mechanism into and out of gear with the clock movement or train.

The size of the wire, its material, and its convolutions on the cores of the electro magnet can be such as to produce sufficient ohms of resistance to the passage of the electric current without an auxiliary resistance medium or coil, but I have found by experience that an electro magnet so constructed as to offer such great resistance, when applied to such uses and purposes as herein contemplated, will heat to an objectionable degree; hence I prefer using an auxiliary resistance medium in combination with the electro magnet.

A preferred auxiliary resistance medium is shown at Figs. 1, 2 and 6, consisting of a resistance coil T, in which the wires are wound or coiled upon pins t, which pins are fixed in frame plates t', and located as shown at Fig. 6, or in any ordinary manner which will permit the passage of air through open spaces t^2 between the series of coils of the wire, for the purpose of preventing it heating to any objectionable extent. This auxiliary resistance coil T, as shown, is located below the electro magnet, but it may be located in any other suitable or desirable place. By using the resistance coil, as shown and described, and of such wire as is best adapted for the purpose, only the passage of the very small amount of electric current will be permitted, which is sufficient to operate the trip mechanism of the meter, and an electro magnet may be used not having such resistance as will cause it to become heated.

It will be evident to any person skilled in the art to which this invention appertains, that various kinds of resistance coils or resistance mediums of any suitable kind may be used as auxiliary to the electro magnet, which mediums or coils have sufficient and proper ohms of resistance to the passage of the electric current.

A rod V is fixed to and extends upwardly from the armature W' of the electro magnet W, and passes through suitable bearings in the frame bar w on which the magnet rests, and through the back armature or yoke w^2, in which bearings it slides lengthwise of itself with the movements of the armature W' to and from the electro magnet, while said bearings serve to not only stay and direct the rod V, but also serve to hold the armature in proper alignment with the cores or poles of said magnet. The upper end of the rod V is pivotally connected with one arm y of a three-armed lever Y, which lever Y is pivoted at y' to a bracket plate y^2 which projects from a bar of the clock movement frame. Another arm y^3 projects from the lever Y and strides a circumferentially grooved part of the member m' of the clutch M, and its third arm y^4 is adapted to come in contact with and to be released from the friction wheel L, as hereinafter described.

To provide means for adjusting the rod V to proper lengths to suit different adjustments of the clock movement and registering mechanism relatively to the electro magnet, and for the removal and replacement of the clock and register, or the electro magnet, without removal of the other, I have shown the rod V as formed in two parts, v and v', united by a coupling v^2, (see Figs. 2 and 3,) in which a threaded sleeve v^3 is used to unite the adjacent threaded ends of the parts v, v', and is held in place after adjustment by a jam nut v^4, which screws upon the part v'.

To adjust the parts v, v' to make the rod V the proper length, the part v should be raised until the end of the lever Y strikes the shoulder y^5 in the bracket y^2, as shown by dotted lines at Figs. 3 and 4, and the part v' be raised until the armature comes in contact with the magnets, when the sleeve v^3 may then be screwed into place on the adjacent ends of said parts to fix and hold them in place.

When the switch C is open, as shown at Fig. 1, there will not be any electric current through the electro magnet, and the armature will remain free from said magnet and in its lower position, as shown by full lines in the drawings, and in this position will through the instrumentality of the rod V hold the lever Y in the position shown by full lines in the drawings, in which position the arm y^3 will hold the member m' of the clutch out of engagement with the member m, and thereby permit the clock movement to run without operating the registering mechanism.

When the switch C is closed to establish an electric current through the wires A' to operate the lamps or other devices that may be operated by the electric current, a portion of said current as permitted by the resistance of the electro magnet and the resistance medium as hereinbefore described, will pass through the electro magnet and resistance coil, and the armature will be attracted or drawn upwardly to the poles of the magnet, thereby raising the rod V upwardly to tilt or swing the lever Y into the position shown by dotted lines at Fig. 3, and move the member m' of the clutch into engagement with the member m, and thereby throw the clock movement into gear with the registering mechanism. The registering mechanism will then be operated by the clock movement so long as the electric current is continued unbroken and the clock movement running. When the lever Y is swung into the position shown by full lines at Figs. 3 and 4, to throw the clock movement out of gear with the registering mechanism, as hereinbefore described, the end y^4 of said lever will be brought into contact with the periphery of the wheel L, to act as a brake to prevent movement of the parts of the registering

mechanism until again thrown into gear with the clock movement by again closing the key C and starting the electric current through the magnet. Without this brake the friction of the shaft g in the hub of the wheel L might cause it to operate the registering mechanism when the clutch M was not in gear. I prefer a friction wheel L to a gear wheel in which the brake might act as a detent click, as a friction brake and wheel will not arrest the movement of the wheel L and other parts so suddenly as to cause any jar to the parts.

When the armature is in its elevated position, and the members m, m', of the clutch in gear, the end y^4 of the lever Y, as shown by dotted lines at Fig. 3, will be in contact with the shoulder y^5, of the bracket y^2 also shown by dotted lines at same figure, and will hold the member m' from being pressed by the armature against the member m with such force as may produce friction in any of the journal bearings of the registering mechanism.

Readings are taken from the dials n^3, p^3, and r^3 in an ordinary manner, that does not require description herein, and any reading or record shown or indicated by the respective pointers on said dials while it shows the number of hours that the registering pointers n^2, p^2, and r^2 have been operated by the clock movement, also shows the number of hours that the electric current has been used in lighting the lamps or for other purposes.

I prefer a clock movement that will run one month, so that readings can be taken from the register once a month, and the clock wound at the same time, but a clock movement that will not run so long a time may be used, and wound when required.

It will be evident that the hands of the clock movement will point out the time of day in an ordinary manner.

I do not consider the scope of my invention as limited by any means to its use alone on a branch or branches of a main electric circuit, as it will be evident to any person skilled in such matters that the invention may be adapted to a main circuit by simply fitting and constructing the parts for such use, in an apparent manner.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a meter for measuring and registering the duration of electric currents, the combination with an electro magnet, its armature, a clock movement and a time registering mechanism, of a trip mechanism operated by the movements of the armature, and consisting of a rod which is connected at one end with the armature, the other end being connected with one arm of an elbow-lever, another arm of said elbow-lever being adapted to engage with or operate a clutch to throw the clock movement into gear with the time register, substantially as and for the purpose specified.

2. In a meter for measuring and registering the duration of electric currents, the combination with an electro magnet, its armature, a clock movement and a time registering mechanism, of a trip mechanism, operated by the movements of the armature, and consisting of a rod adjustable in length, which is connected at one end with the armature, the other end being connected with one arm of an elbow-lever, another arm of said elbow-lever being adapted to engage with or operate a clutch to throw the clock movement into gear with the time register, substantially as and for the purpose specified.

3. In a meter for measuring and registering the duration of electric currents, the combination with an electro magnet, its armature, a clock movement, and a time registering mechanism, of the rod V, one end of which rod is connected with said armature and the other end with one arm of an elbow-lever Y, a clutch M adapted to be operated by another arm of said elbow-lever to connect the clock movement to the registering mechanism, a shaft g and pinions G and l' connected with said shaft and friction wheel L fixed to rotate with the pinion l', and adapted to be operated upon by another arm of the lever Y, substantially as and for the purpose specified.

4. In a meter for measuring and registering the duration of electric currents, the combination with an electro magnet, its armature, a clock movement, and a time registering mechanism, of the rod V one end of which rod is connected with said armature and the other end with one arm of an elbow-lever Y, pivoted in a bracket so that one of its ends or arms y^4 will strike a shoulder y^5 of said bracket when the armature and rod V connected therewith are moved upwardly, a clutch M adapted to be operated by another arm of said elbow-lever to connect the clock movement to the registering mechanism, a shaft g and pinions G and l' connected with said shaft at opposite ends thereof, substantially as and for the purpose specified.

5. In a meter for measuring and registering the duration of electric currents the combination with a clock movement and a registering mechanism, of the elbow-lever Y adapted to operate a divided or two-part clutch M to connect the clock movement and registering mechanism together, one of the parts or members of said clutch being connected with the registering mechanism and the other part with the clock movement, a shaft g and pinion G thereon, connected with the clock movement and a pinion l' fixed to one part or member of said clutch M, all arranged and adapted to operate substantially as and for the purposes set forth.

6. In a meter for measuring and registering the duration of electric currents the combination with a clock movement and registering mechanism of an elbow-lever Y adapted to operate a divided or two-part clutch M to connect the clock movement and the registering

mechanism together, a shaft g, a pinion G thereon connected with the clock movement a pinion l' connected with the time registering mechanism and fixed to rotate with one member m of the clutch M, a friction wheel L also fixed to the said member m and adapted to be operated on by one arm of the elbow-lever Y substantially as and for the purposes set forth.

7. In a meter for measuring and registering the duration of electric currents the combination with a clock movement and registering mechanism of a wheel N adapted to engage with a pinion l', a wheel P adapted to engage with a pinion n, a wheel R adapted to engage with a pinion p and pointers n^2, p^2 and r^2 all forming part of the registering mechanism, a divided or two-part clutch M, one member of which is fixed to the pinion l', a shaft g and pinion G connected therewith forming part of the clock movement, and an elbow-lever Y adapted to operate the other member of said clutch to lock them together so as to connect the clock movement and registering mechanism together, substantially as and for the purposes specified.

In testimony whereof I affix my signature in presence of two witnesses.

HENRY H. PATTEE.

Witnesses:

R. C. HUNT,

CHARLES BROWN.

(No Model.) 3 Sheets—Sheet 1.

C. S. GIBSON.
ELECTRIC TIME ALARM.

No. 498,710. Patented May 30, 1893.

Fig. 1.

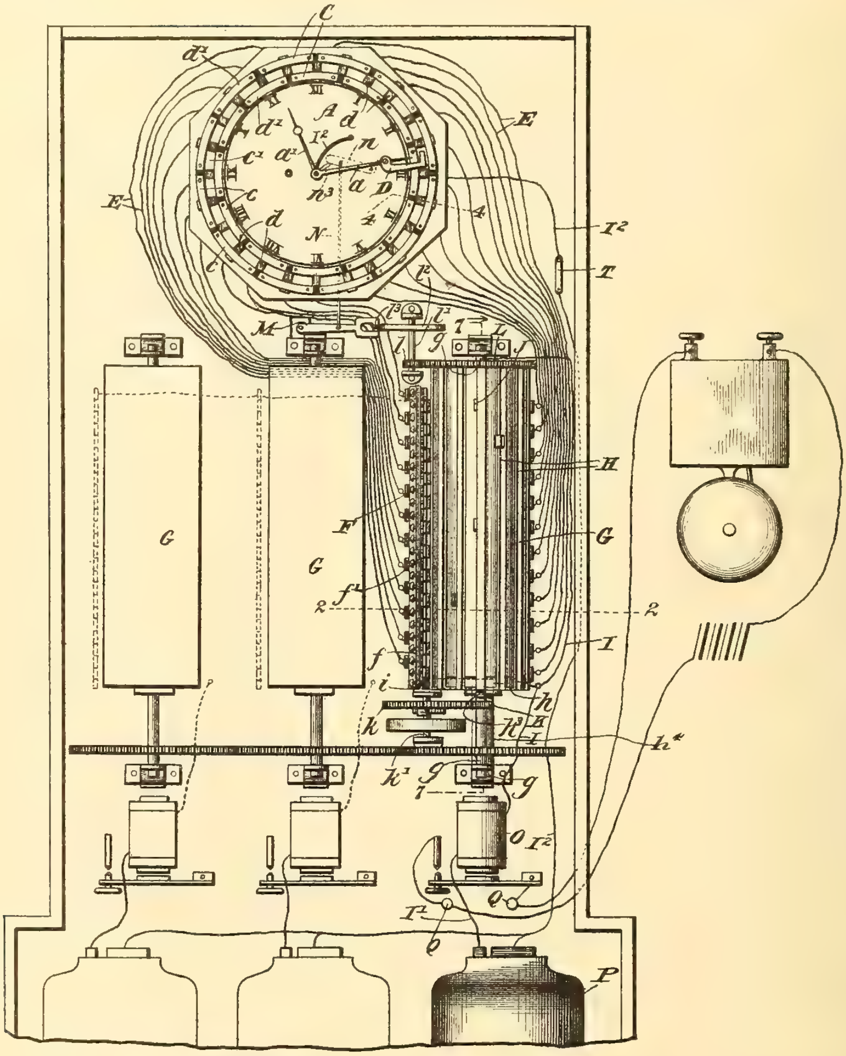
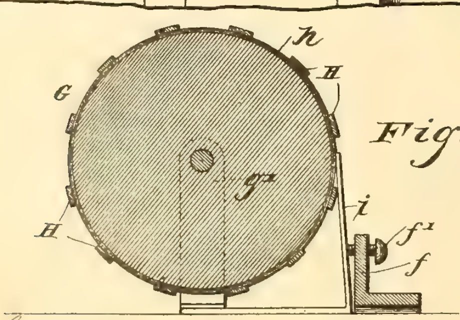


Fig. 8.



Witnesses;

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By his Attorneys,

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(No Model.) 3 Sheets—Sheet 2.

C. S. GIBSON.

ELECTRIC TIME ALARM.

No. 498,710. Patented May 30, 1893.

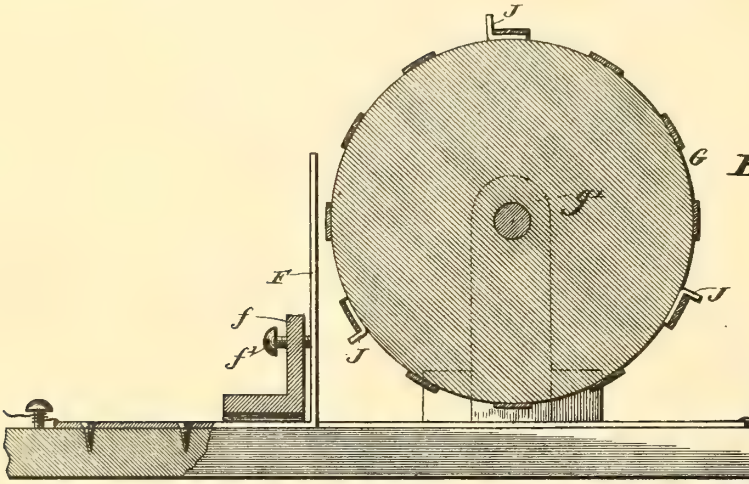


Fig. 2.

Fig. 9.

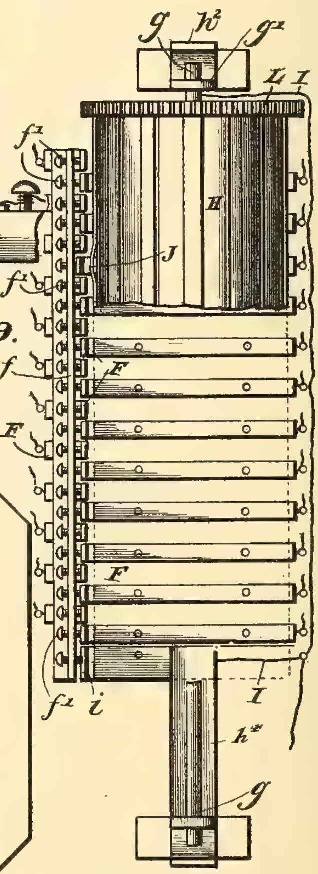


Fig. 3.

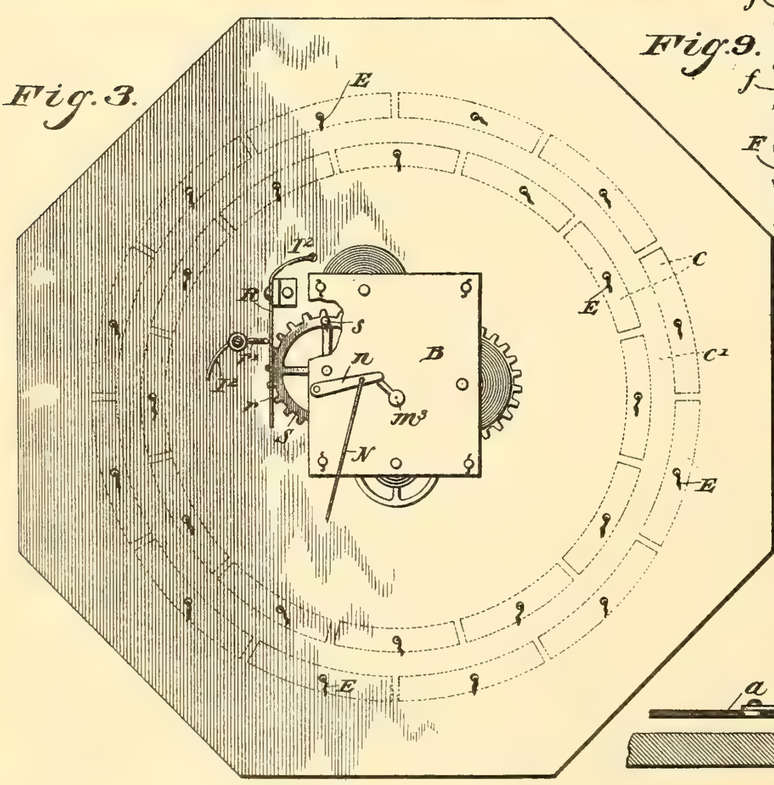
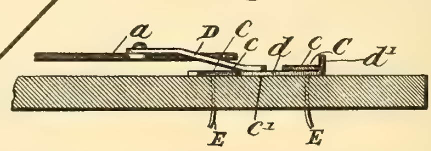


Fig. 4.



Witnesses;

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(No Model.) 3 Sheets—Sheet 3.

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ELECTRIC TIME ALARM.

No. 498,710. Patented May 30, 1893.

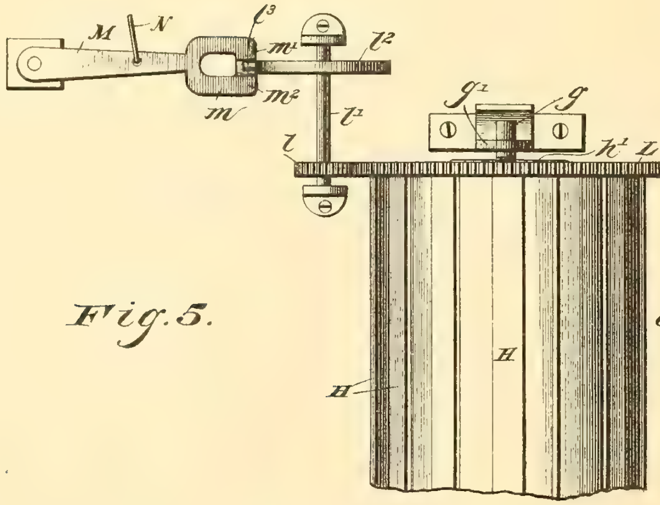
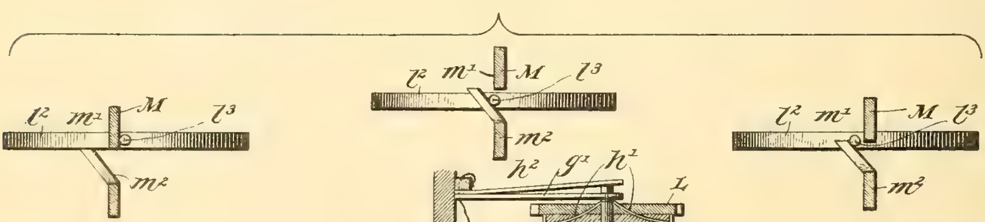


Fig. 5.

Fig. 6.



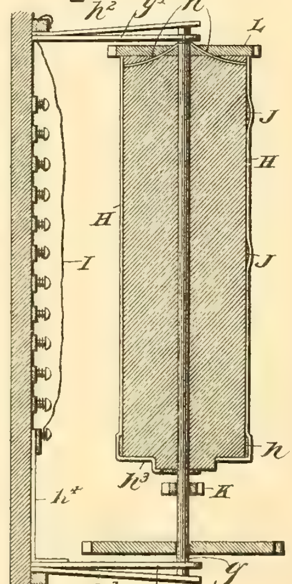


Fig. 7.

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UNITED STATES PATENT OFFICE.

CHARLES SCHUYLER GIBSON, OF SOUTH NEW BERLIN, NEW YORK.

ELECTRIC TIME-ALARM.

SPECIFICATION forming part of Letters Patent No. 498,710, dated May 30, 1893.

Application filed October 12, 1892. Serial No. 448,674. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SCHUYLER GIBSON, a citizen of the United States, residing at South New Berlin, in the county of Chenango and State of New York, have invented a new and useful Electric Signal-Clock, of which the following is a specification.

This invention relates to electric signal clocks; and it has for its object to provide an improvement in clocks of this character whereby a system of electric bells can be rung at irregular intervals during one day or a part of a day, or during the entire week or part of the week as desired.

To this end the invention primarily contemplates a device wherein certain contacts on the face of the clock are rendered live or dead, to secure the proper signals and in order to especially adapt the signal clock for school purposes in indicating class recitation hours, and also in the railway service for dispatching trains, &c.

With these and other objects in view which fall within the scope of this invention, the same consists in the novel construction, combination and arrangement of parts hereinafter more fully described, illustrated and claimed.

In the accompanying drawings:—Figure 1 is a front elevation or plan view of an electric clock system, constructed in accordance with this invention. Fig. 2 is a detail sectional view on the line 2—2 of Fig. 1. Fig. 3 is a rear elevation of the clock, showing the regulating circuit closer and the clock mechanism, together with the releasing device operating lever. Fig. 4 is a detail sectional view on the line 4—4— of Fig. 1. Fig. 5 is a detail plan of the upper end of one of the contact rollers and the releasing device connected therewith. Fig. 6 is a series of detail sectional views illustrating the operation of the roller releasing device. Fig. 7 is a detail sectional view on the line 7—7 of Fig. 1. Fig. 8 is a detail cross-section at the ring end of the rollers. Fig. 9 is an enlarged detail plan view showing the brushes and connections thereto.

Referring to the accompanying drawings, A represents the clock or dial face numbered in the usual manner and over the face of which travels the minute and hour hands a and a', respectively, both of which are connected to and operated by an ordinary clock mechanism B, secured to the rear face of the dial plate A and inclosed in any suitable frame, the entire operating mechanism hereinafter described used in connection with the clock, being designed to be mounted within a single frame or in any suitable relation to secure an operative result. Secured upon the dial plate and inclosing the numerals therebetween are the inner and outer circles of conducting plates C, each circle comprising a series of separate and independent plates c, secured at their ends to the dial, and insulated from each other so as to have separate and independent connections. There are preferably twelve plates in each circle corresponding to the number of hours on the dial, making twenty four plates in both circles, each plate of one circle being adapted to break joints with the plates of the opposite circle, so that there is no loss in the possible connections which might be made.

The two circles of conducting plates C, inclose there-between a circular path of non-conducting material c', below which are printed the numerals, and in this path between the said circles is designed to travel the contact brush or foot D, secured to the minute hand, a, near its outer end and normally contacted with said non-conducting path. The brush or foot D, traveling between the circles of plates, is designed to contact and make connection with the contact plugs d, arranged upon the face of the dial and inserted beneath the said plates so as to project into the path of the hand brush, and said plugs which are provided with flanged finger ends d', are designed to be slid under the conducting plates c, at the several hours and fractions of the hour, that it is designed to cause the signal or signals to sound, but as hereinafter described, some of said plugs are designed to be live during one hour, while others are dead during the same hour, and vice versa, during another hour.

Each of the conducting plates c, of each circle has connected therewith a separate circuit wire E, which leads from the clock dial to its contact brush F, arranged in series at a suitable point adjacent to the clock. The metallic contact brushes F, are fixedly secured at one end to the base frame supporting the entire mechanism, while their other

ends project outward from the base frame in a line with each other at one side of the screw-strip f. The said screw-strip f, is also secured to said base and accommodates a series of regulating screws f', the pointed ends of which work against the projecting spring ends of the twenty four spring contact brushes F, which are separately connected by the wires E to a particular conducting plate upon the face of the dial of the clock, and therefore in electrical connection therewith. The said brushes F, project alongside of and in close proximity to one of the series of connecting or circuit closing rollers G, illustrated in Fig. 1 as arranged side by side, in a series, in relation and connection with a similar set of contact brushes such as those just described, but since one roller is sufficient to operate one system of bells, I will confine my description to one roller and the connections for one roller.

The contact roller G, is constructed of wood or other suitable non-conducting material, and is provided with the metallic journal ends g, working in the bearing arms or brackets g', arranged at each end thereof and projecting outwardly from the base to which the device is secured. The said roller G, is preferably divided into twelve equal parts corresponding to the hours on the clock dial, and such divisions are indicated by a longitudinal series of metallic connecting plates H, electrically connected at one end by the continuous connecting ring h, while to the other ends of said strips or plates are connected the short wires h', electrically connecting these ends of said strips or plates to the upper metallic journal of the roller, both of which slightly projects through the bearing arms or brackets g', and contact with the end spring contact plates h^2, arranged alongside of both brackets in order to secure a perfect electrical connection from the metallic journals to the single circuit wire I, connected directly and by the end connecting plates h^4 with said end plates and with the friction and contact brush i. The said friction and contact brush i, is arranged in the line with the series of brushes F, and contacts with the continuous connecting ring h, at one end of the roller, in order to retard the movement of the roller when rotating, and also to insure the proper connection from the roller to the wire I, forming a part of the circuit to be described. At the lower end of the roller opposite the short wires h', one of the plates H, is extended as at h^3, and connects with the lower metallic journal to secure the three connections for the wire I, as described.

The contact roller G, as described, travels in close proximity to the brushes F, and therefore normally out of contact therewith. Said roller presents the strips or plates H, to the brushes F, one at a time, but there is no connection between the same unless in that particular plate roller plugs J, are inserted. The said roller nodes J, are constructed similar to the dial plugs d, and are adapted to have their flanged ends contact with that brush directly opposite the same.

It will be readily understood that according to the fractions of the particular hour at which it is desired for the clock to signal, roller plugs are inserted in the connecting strip or plate corresponding to that hour, so that such plugs will connect in the complete circuit only those brushes which are connected to the dial plugs, which are to be in the circuit during that hour, thereby rendering all other dial plugs inactive during the same hour. The next hour is supposed to have different intervals at which the clock is to signal, and therefore the device is arranged so that at the end of each hour the roller automatically revolves one twelfth of a revolution, in order to present a new connecting strip or plate, and therefore a differently arranged set of roller contact plugs, which closed the circuit with certain other dial plugs, the purpose of which will at once suggest itself.

In order to provide for the hourly partial revolution of the connecting enlivening roller G, the lower spindle end thereof is provided with a pinion K, with which meshes the gear wheel k, mounted upon the spring actuated shaft k', wound up in any suitable manner, and normally tending to rotate such roller, which is designed to be held stationary for a whole hour and at the end of that hour to be released sufficiently long to make its one twelfth of a revolution. To the upper end of the roller or the upper spindle thereof, is secured the large gear wheel L, meshing with an adjacent small pinion l, mounted upon a short shaft l', which carries the stop and releasing wheel l^2, having projecting from its periphery the stop and releasing pin l^3, that is adapted to engage and disengage the releasing lever M. The said releasing lever M is pivoted at one end to a suitable point of attachment above the roller, and is adapted to be lifted and dropped once every hour. The said releasing lever M, is provided at the free end thereof with the head m, having the upper and lower overlapping tongues m' and m^2 respectively, said tongues, though overlapping, being out of contact with each other to leave an escape opening for the stud or pin of the wheel l^2. A wire or rod N, is connected to the pivoted lever M and to the lifting lever n, pivoted to a suitable point of attachment back of the clock mechanism B, and having its free end lying in the path of the lifting arm m^3, secured to the rear end of the minute hand shaft, so that said arm will come in contact with the lifting lever once an hour, to raise and then suddenly drop the same to release the wheel l^2 from the releasing lever, and allow it to make one revolution, which permits the spring actuated connecting roller to revolve one twelfth of a revolution. Normally, during the hour, the pin l^3, rests against one side of the upper tongue m'. At the end

of the hour when the lever m is raised, the upper tongue is raised above the pin so that the same drops onto the lower pin. Now, when the said lever is dropped, the pin or stud of the wheel is in a position to pass through the opening between the two tongues, so that the wheel l^2 can make its revolution, after which the pin or stud again comes in contact with the upper tongue.

The circuit wire I, from the connecting roller, is preferably connected to the relay O, which connects by the wire I′, with the battery P, while the clock circuit is completed through the wire I^2 to the minute hand a, of the clock, which hand completes the circuit through the plugs as already mapped out. The relay is inserted in order to cut in a separate battery or series of batteries for the electric bells, and the relay wires lead to the binding posts Q, to which are connected any suitable bell system such as that illustrated.

Now, in order to provide for regulating the duration of the ringing of the bells, I interpose in the circuit wire I^2, a regulating circuit closer R, such as is fully illustrated in Fig. 3 of the drawings. The circuit closer R, comprises the separated spring wire terminals r and r', respectively, normally out of contact with each other and adapted to be pressed into contact as long as it is desired to have the bells ring. One of the terminals r, is arranged adjacent to a wheel of the clock mechanism, as S, having a known revolution, (one minute,) and this wheel is provided with a projecting stud s, which during an interval or at least during a part of the minute, is designed to press the terminal r, in contact with the terminal r', and hold it in such contact until the same has passed such terminal.

The duration of contact of the circuit closing terminals is regulated by separating the same different distances apart, as will be readily apparent. A switch T, may be interposed in the circuit, if so desired.

Although one roller and its connections have been described, nevertheless, it will be readily seen that the system can be greatly enlarged by employing a series of such rollers G, as illustrated in Fig. 1 of the drawings, such rollers all being geared together and operated by the same mechanism, and in such arrangement each relay is designed to cut in a different system of bells, so that several different signals can be sounded at the same time if so desired, which will be easily understood to those skilled in the art.

The operation of the clock system has already been outlined in the description of the several parts thereof, the circuits being clearly illustrated in the drawings. As will be now readily understood, when the brush of the minute hand comes in contact with one of the dial plugs, while the same is thereon, the regulating circuit closer will close the circuit and cause the alarm to be sounded if that particular dial node is in the circuit, that is if it has a corresponding roller plug in contact with its own brush, as already described. This operation is repeated at irregular intervals, whenever the minute hand brush contacts with a live dial node. The periods of signaling are different from the plugs on the dial being cut in the circuit once an hour by the mechanisms herein described and set forth.

It is now thought that the operation and advantages of the herein described clock system will be obvious to those skilled in the art without further description, and it will of course be understood that all modifications falling within the scope of the invention are reserved to my option.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric signal clock, the combination with the clock; of the concentric rows of separated conducting plates breaking joints, flanged dial plugs adapted to be removably inserted under said plates and to project into the path inclosed between the rows, the clock minute hand having a spring brush or foot adapted to travel between said rows of plates and over the projecting ends of the plugs, an automatic intermittently revolving circuit-closing roller, circuit wires leading from each of said separated conducting plates to the circuit closing roller, and a bell circuit connected with the hand and said circuit closing roller, substantially as set forth.

2. In an electrical signaling clock, the clock dial plugs removably arranged upon the face of the clock, the minute hand adapted to connect with the dial plugs, plug brushes arranged at a suitable point and connected separately by wires with separate dial plugs, an intermittently revolving spring-actuated connecting or circuit closing roller having roller shifting plugs adapted to contact with certain brushes to close the circuit with certain dial plugs, an independent automatic stop and releasing device for said roller, and electrical connections from the roller and the clock hand to a bell circuit, substantially as set forth.

3. In an electric signaling clock, the clock, dial plugs removably arranged upon the dial of the clock, the minute hand traveling over said plugs, a circuit closing roller mounted for revolution, and having a longitudinally disposed parallel series of electrically connected metallic connecting plates, flanged roller plugs adapted to be removably inserted under said separate connecting strips or plates in any shifted position, means for partially revolving said roller hourly, a series of adjustable plug brushes arranged in a line in close proximity to the roller at one side of the same and adapted to contact with the roller plugs under the plate facing the brushes, separate wires leading from each brush to a separate dial plug, and electrical connections from the electrical connections of said roller plates and the clock hand to a bell circuit, substantially as set forth.

4. In an electrical signaling clock, the com-

bination with the clock, the dial of which is provided with a series of contact plugs making connection with the minute hand; of a circuit closing roller having a longitudinal series of connecting strips or plates connected at both ends with the metallic journals thereof, an auxiliary connecting ring connecting said strips at one end, an adjustable combined friction and contact brush adapted to contact with said connecting rings, wires connecting the metallic journals of the roller and said brush in a single connection, roller plugs adapted to be inserted under the metallic strips or plates, adjustable plug brushes arranged adjacent to the roller and adapted to contact only with plugs thereon, separate circuit wires leading from each brush to separate dial plugs, means for actuating said roller, means for releasing the roller hourly for a partial rotation, and a bell circuit completed through the hand of the clock and the connections of the roller, substantially as set forth.

5. The combination with a signaling clock system and the circuit closing roller thereof having a gear wheel at one end and means for rotation at the other end; of a short shaft having a small pinion meshing with said gear wheel and a combined stop and releasing wheel having a projecting pin or stud, an adjacent releasing lever pivoted at one end and having at its other free end upper and lower overlapping tongues leaving an escape space therebetween for the pin or stud of said wheel, which normally bears against the upper tongue above the escape opening, a lifting lever connected with said releasing lever, and a lifting arm secured to the minute hand shaft of the clock and adapted to raise and drop said lifting lever to raise and drop the releasing lever, substantially as set forth.

6. In an electric signaling system, the combination, with the bell and clock circuits electrically connected, and a wheel of the clock having a single projecting stud; of a circuit closer included in the clock circuit and comprising normally separated spring wire terminals, one of which lies alongside of the studded wheel and is adapted to be engaged by said stud to close the circuit with the other terminal and regulate the duration of the sounding of the signal, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES SCHUYLER GIBSON.

Witnesses:

CLARK JOHNSON,

FRANK LAMB.